CGIAR
Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Science, Innovation and Policy Symposium

IFPRI HQ, Washington D.C., 10-11 December 2024

Welcome Remarks

ROB VOS, Initiative Lead

CGIAR | Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Food System Challenges

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

01

Food sector is largest source of income & employment but unable to provide decent livelihoods for billions depending on it

02

Rural and urban workers employed in the agrifood sector only get a small piece of the economic pie and are unable to afford a nutritious diet

03

Weaknesses & inefficiencies in VC are generating poor outcomes for the people and the environment

To address these challenges…

…the ***Rethinking Food Markets*** **Initiative** is generating evidence on innovations, incentives and policies effective for creation of equitable income and business opportunities.

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Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Key Objectives of the Rethinking Food Markets Initiative

1

Poverty reduction

...through more employment and better incomes for smallholders and SMEs (especially women and youth)

2

Lower GHG emissions

....in domestic and global food markets and value chains

3

Affordable healthy diets

....for poor people and nutritionally vulnerable population

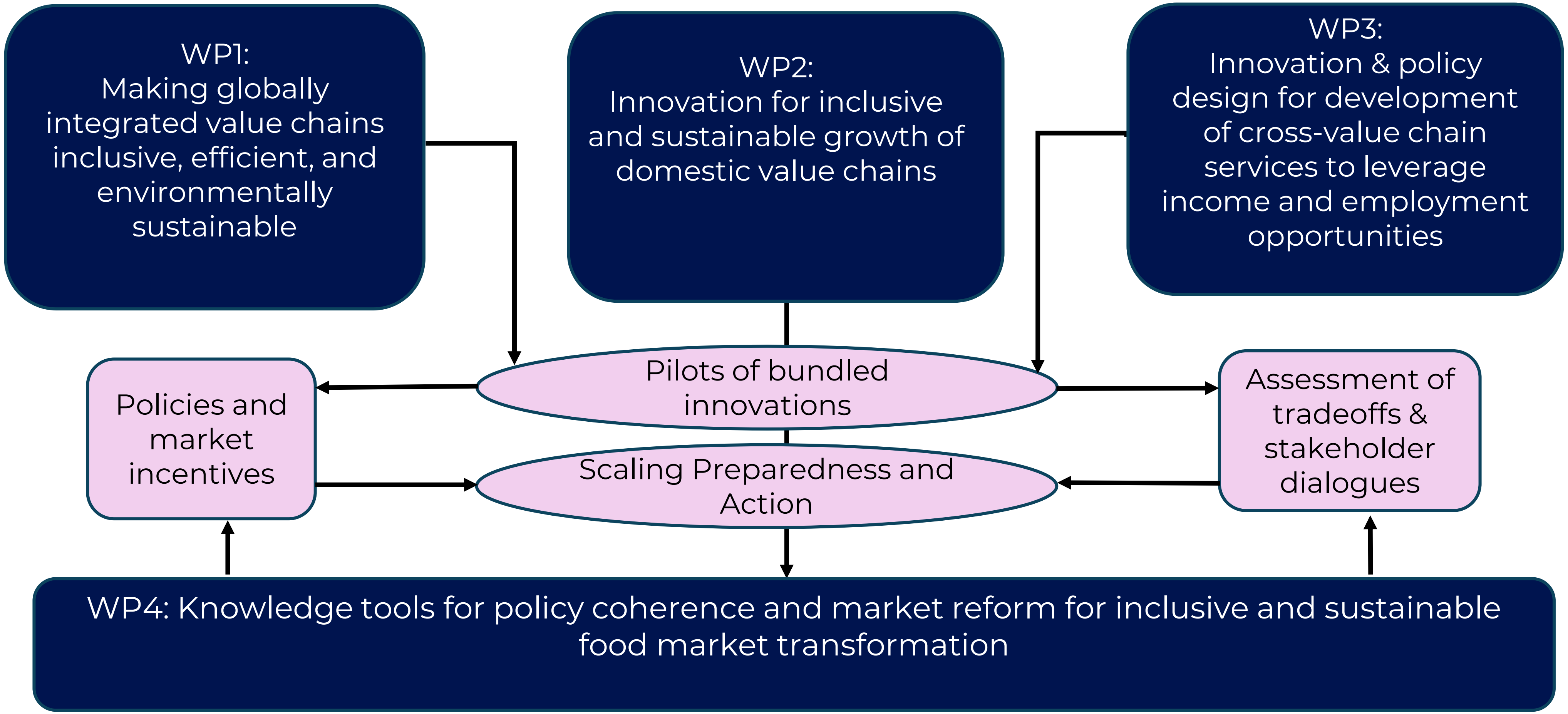
4

Less food loss

....and waste through improved quality control and logistics

Work Packages under the CGIAR
Rethinking Food Markets Initiative

CGIAR
Rethinking Food Markets and Value Chains for Inclusion and Sustainability



Research approach

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

01

- Scoping studies to identify VC development potential and innovation needs
- Co-design innovations with stakeholders

02

Testing of bundled innovations in food markets, VCs and cross-VC services

03

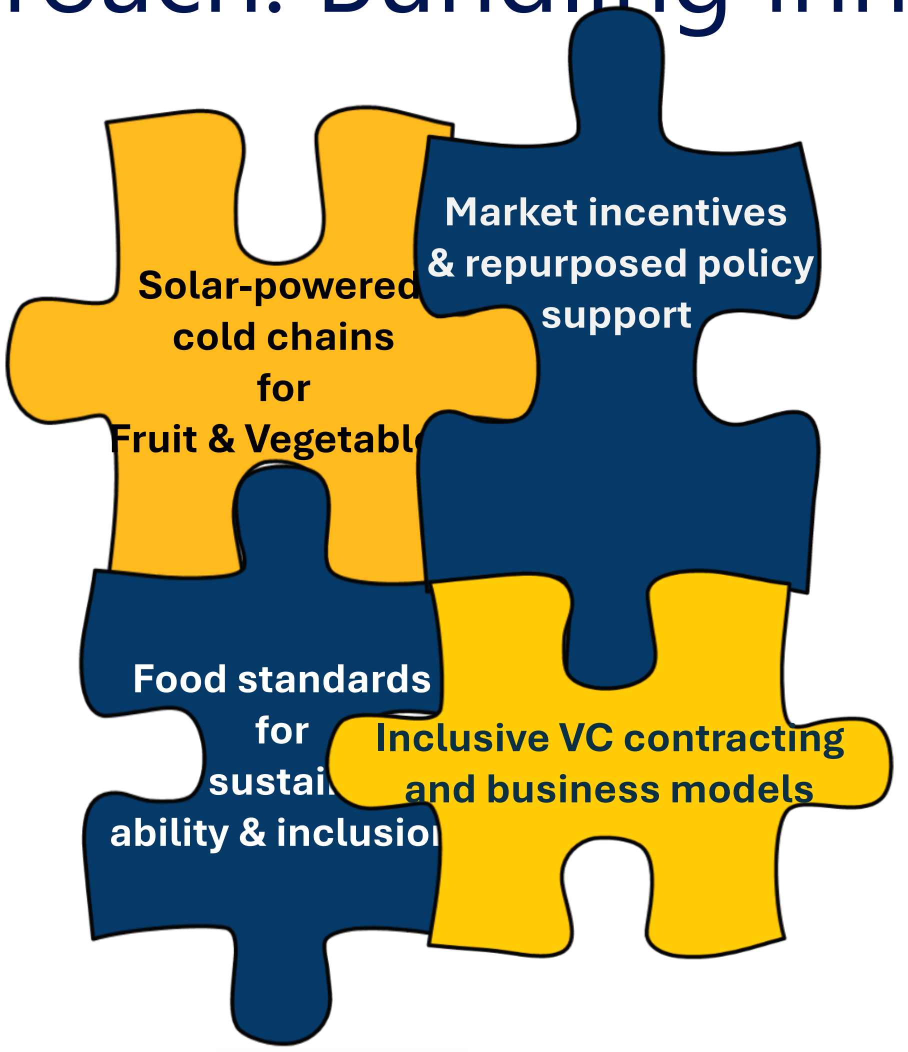
Model-based scenario analysis and stakeholder dialogues to identify scaling potential and policy support needs

04

Knowledge sharing through KISM CoP

Scaling up through market-wide incentives

Approach: Bundling innovations and interventions



- **More employment and higher incomes (esp. for women & youth)**
- **Less food loss**
- **Affordable healthy diets**
- **Lower GHG emissions**

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Geography & Partners

Countries

Africa – Ethiopia, Uganda, Nigeria
Asia – Bangladesh, Uzbekistan
Central America – Honduras

Partners

Research, innovation and scaling partners: ISEAL, Wageningen Research, MSU, East-West Seed, national research centers & private sector partners

CGIAR Centers

IFPRI, Alliance Bioversity & CIAT, CIMMYT, ICARDA, IITA, IWMI

Bangladesh

Shrimp value chain

Targets:
Improve incomes through 3 approaches to raising productivity & product quality

Research Methods: Impact evaluation of innovation bundle

Innovations: Three approaches to raising yield & quality by aggregating production & marketing, input delivery, and promoting traceability

Partners:
Dept of Fisheries; Bangladesh Shrimp Foundation
ACI Agrolink

Bangladesh

F

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Digital financial innovation

Targets:
Increased financial access for livestock purchase, strengthened women's agency

Research Methods RCT on standard loan and profit-sharing products

Innovations: e-finance platform for financing asset purchases targeting women

Partners: WeGro

Ethiopia

F

Sesame value chain

Targets:
Improve incomes through quality certification of sesame and improved market information

Research Methods: Impact evaluation of innovation bundle

Innovations: Quality grading and certification; improved digital marketing information mechanism; training

Partners: Gondar Ag Research Center, ECX, Ethiopia Telecom

Honduras

F

Coffee value chain

Targets: Improve vertical coordination, improve coffee quality, prepare for EUDR, credit and gender equality

Research methods: rigorous evaluation of the impact of technical assistance and quality control

Innovations:
- Improved quality control methods
- Linking smallholder farmers to export markets through certification and quality control standards
- Access to credit for women

Partners: BECAMO, Beneficio Río Frío, Beneficio Rosales, Volcafe, SwissContact

Honduras

F

Beans and maize value chains

Targets: To improve the efficiency of the bean and corn value chains; improve the incomes of agricultural enterprises and SMEs through improved product quality and vertical integration of the maize and bean value chain

Research methods:

- Impact assessment of trade linkages between beans and maize
- Qualitative evaluation of policies and institutions for the development of maize and bean VCs
- Evidence of consumers' willingness to pay

Innovations

- Product innovations (corn and bean-based chips, packed foods, flour)
- Reform of support policies
- Marketing of new products

Partners:
ARSAGRO CECRUSCO UNAH Maturave; AgriLac

Nigeria

F

F&V value chain

Targets: Seeds, Logistics & Marketing innovations; Improving returns & efficiency in fruits & vegetables value chains , reduce food losses, improve livelihoods

Research Methods: Impact evaluations of 5 innovation bundles

Innovations:

- Improved seed& branding (WUR/EWS)
- Cooled storage & transportation (ColdHubs, U.Jos)
- Labeling (ColdHubs, U.Jos)
- Solar dryers & Mktg/logistics (NSPRI)
- Plastic crates & Mktg/logistics (Bunkasa)

Partners: NSPRI, ColdHubs, Bunkasa, U. Jos, East-West Seeds

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Nigeria

F

Flexible digital finance

Target: Increasing flexibility in digital credit products to access to inputs and markets and improve livelihoods

Research Methods: Pilot program evaluating feasibility of top-up loans: cash or inputs

Innovation: Crop2Cash input loan

- ✓ Control
- ✓ Input loan top-up
- ✓ Cash loan top-up

Partners: Crop2Cash, Sterling Bank

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Uganda

F

Dairy value chain

Targets:

- Empower MCCs with data-based information on milk quality and enhance their capacity to bargain for better prices or better markets
- Enable rewards to suppliers of raw milk of better quality thru price premiums based on data

Research Methods: Impact evaluation of innovation bundles

Innovations: Test the impact of milk analyzers on milk quality and quality-based payment system

Partners:
IFPRI, CIMMYT, DDA, SNV, MCCs, Farmers, Processors, MAAIF

Uganda

F

Digital access to inputs and training safe use of agrochemicals

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Target: Address the problem of limited awareness of existing innovations that has limited scaling or uptake of the innovations

Research Methods:

- Impact evaluation in five districts of Central Region

Innovations:

- Digital literacy training focused on e-access to genuine, traceable agro-inputs
- Agronomic training with a focus on the safe use and handling of agrochemicals

Partners:
EzyAgric by Akorion Limited, Alliance of Bioversity and CIAT, Agro-input merchants, Farmers and Farmer Organizations, Input manufacturers, MAAIF & NARO, Uganda Agri-business Alliance- Export Associations

Global (WP4/5)

1) **KISM**
2) **Meta Studies & Guidelines**
3) **Agrifood database**
4) **Global & country policy modeling**
5) **Scaling preparedness**

Knowledge Platform – KISM established; hub for webinars and science sessions: Community of Practice

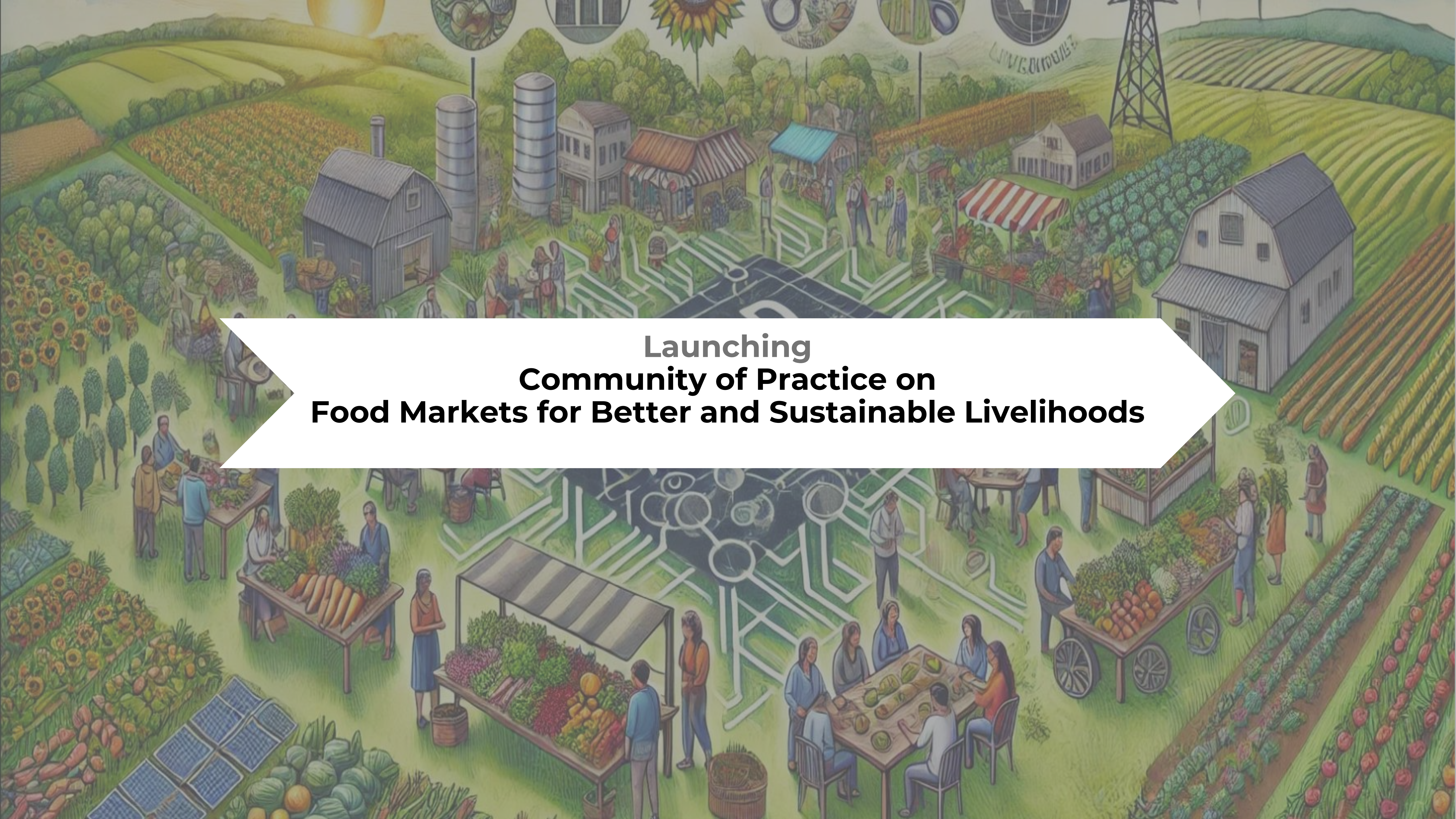
Meta Studies on value chain innovation dynamics, decent employment impacts and VC development in informal market settings – briefs and guidelines being completed

Agrifood database – identify employment (potential) and distribution of incomes and value added across agrifood system

Global and country policy modelling –

- Agincentives database of policy indicators
- Global scenario analysis of repurposing of agricultural support
- Country modelling of impacts of scaled interventions and policy support in 5 countries

Scaling preparedness – Process tracing and Stakeholder workshops



Launching

Community of Practice on Food Markets for Better and Sustainable Livelihoods

Community of Practice on Food Markets for Better and Sustainable Livelihoods

The Community of Practice has been designed to bring together experts, food system actors, and organizations with a shared interest in enhancing the efficiency and sustainability of food value chains and markets.

The CoP aims to address the growing need for innovations in food systems that lead to more equitable income and employment opportunities within food markets.

Join the community: KISM FOOD AND MARKETS
Subscribe to our newsletter: CGIAR research initiative on Rethinking Food Markets

Scan the QR code to visit the CoP page.

Objectives and Key Questions for Symposium

What have we learned from the research approach and co-design of bundled innovations?

What is the real potential for fast adoption of such innovations, and will they really lead to inclusive and sustainable food system transformation?

What role for policies in setting standards, incentives, investments, etc. to support scaling and address trade-offs?

What have we learned about market functioning and dynamics?

How can we continue capacity sharing through KISM CoP? What are remaining knowledge gaps to be taken on in follow up research in the 2025-2030 CGIAR Science Programs?

Dec. 10

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

AGENDA

PLENARY SESSION A			
9.30 – 10.00 am	**Keynote**	Johan Swinnen, IFPRI Director-General	Conference Room 12A
10.00 – 11.00 am	Discussion topic: Improved logistics to reduce food losses, improve incomes and value-chain efficiency	Moderator: Ruth Hill, IFPRI	Conference Room 12A
11.00 – 11.30 am	Coffee break		
11.30 am – 12.30 pm	**Parallel Session1**: Digital innovations for product tracing and making market information accessible - I	Moderator: Kate Ambler, IFPRI	Conference Room 12A
11.30 am – 12. 30 pm	**Parallel Session 2**: Innovations for product quality upgrading and food quality standard certification - I	Moderator: Rob Vos, IFPRI	Conference Room 12 CD

⏭ Continued…

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

		PLENARY SESSION B	
1.30 – 2.30 pm	**Keynote**	Matin Qaim, Director ZEF, Bonn, Germany	Conference Room 12A
2.30 – 3.30 pm	**Parallel Session 3:** Digital innovations for tracing products & making market information accessible – II	Moderator: Christine Chege, Alliance Bioversity & CIAT	Conference Room 12A
2.30 – 3.30 pm	**Parallel Session 4:** Innovations for product quality upgrading and food quality standard certification - II	Moderator: Nicholas Minot, IFPRI	Conference Room 12 CD
3.30 – 4.00 pm	Refreshments/Networking		12th floor
4.30 – 5.45 pm	**Parallel Session 5:** Inclusive agribusiness models and market information	Moderator: Rajalakshmi Nirmal, IFPRI	Conference Room 12A
4.30 – 5.45 pm	**Parallel Session 6:** Inclusive financing for inclusive and agrifood sustainable value chains	Moderator: Christine Chege, Alliance Bioversity & CIAT	Conference Room 12 CD
		PLENARY SESSION C	
5.30 -5.50 pm	Next steps and overview of Day 1		Conference Room 12A
6.00 – 7.00 pm	Cocktail reception and Networking		12th floor

Dec. 11

AGENDA

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PLENARY SESSION D			
9.15 – 9.30am	Welcome to Day Two	Rob Vos, IFPRI and initiative lead and Christine Chege, Alliance Bioversity & CIAT	Conference Room 12A
9.30 – 11.00am	**Policy Seminar**	Moderator: Charlotte Hebebrand, IFPRI	Conference Room 12A
11.00 –11.30am	Refreshments/networking		12th Floor
PLENARY SESSION E			
11.30am-12.30pm	What do we know about the degree of inclusiveness and employment generation potential of agrifood value chains?	Moderator: Ruth Hill, IFPRI	Conference Room 12A
12.30 – 1.30 pm	Lunch and networking		12th floor
PLENARY SESSION F			
1.30 – 2.45 pm	Feasibility of scaled agrifood value chain innovations, trade-offs and policy reform scenarios	Moderator: Rob Vos, IFPRI	Conference Room 12A
2.45 – 3.15 pm	KISM & guidance documents for innovation adoption and support policies	Kristin Komives and Karin Kreider/Naomi Black, ISEAL	Conference Room 12A
3.15 – 3.45 pm	Refreshments and networking		12th floor

Continued…

PLENARY SESSION G			
3.45 – 4.45 pm	From pilot to scaling. How to determine scaling preparedness and scaling feasibility? Experience from Ethiopia, Honduras, Nigeria and Uganda	Moderator: Rajalakshmi Nirmal, IFPRI	Conference Room 12A
4.45 – 5.30 pm	Closing Panel Discussion	Moderators: Rob Vos, IFPRI and Christine Chege, Alliance Bioversity & CIAT	Conference Room 12A
5.30 – 6.30 pm	Cocktail reception and networking		12^{th} Floor

Housekeeping

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

TIME LIMIT

Each speaker will have 15 minutes time for presentation;
Discussants will have five minutes each

RECORDING

We would like to record the sessions on both days and then share it on KISM – the initiative's knowledge platform. So, request you to sign the consent form, if you have not done already.

HOW CAN I ASK A QUESTION/COMMENT?

We will have a Q&A section at the end of each session
Virtual audience can pop the question in the **chat box /Q&A section**

FIND PRESENTATIONS HERE: https://drive.google.com/drive/folders/1iMtKCydLq4-j1J2yMs9qVarGti2IcEdQ?usp=sharing

Plenary Session A: Keynote

JOHAN SWINNEN, IFPRI Director General

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Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Re/Thinking Institutions of Exchange for Food Systems Transformation

Johan Swinnen

December 2024

Exchange and sustainable development

"The central issue of economic development is the evolution of institutions that create an economic environment that stimulate efficient coordination and exchange to allow for scale economies and increasing productivity …"

Douglas North, "Institutions",
Journal of Economic Perspectives 5(1): 97-112

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Insights from Game Theory – and Empirics

- People and organizations find it worthwhile to cooperate with others when:
  - The play is repeated
  - There is complete information about the other players past performance
  - When there are small numbers of players

  [Conditions A]

- Cooperation is difficult when:
  - The play is not repeated
  - Information about the other players is poor
  - There are large numbers of players

  [Conditions B]

There are many examples of simple exchange institutions that permit low cost transacting under conditions A, but **sustainable growth requires low cost transacting and producing in a world of specialization, thus solving the problems of human cooperation under conditions B.**

"Misconceptions of modern agricultural markets"

- Sexton (AJAE 2012): Microeconomics textbooks continue to point at "agricultural markets" as standard examples of "competitive markets".

Typical example: "*Thousands of farmers produce wheat, which thousands of buyers purchase to produce flour and other products. As a result no single buyer can significantly affect the price of wheat*."

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Typical example: "*Thousands of farmers produce wheat, which thousands of buyers purchase to produce flour and other products. As a result no single buyer can significantly affect the price of wheat*."

- Conditions for "competitive markets":
  - Buyers and sellers must be many and small relative to the total size of the market
  - Products must be homogenous
  - Information must be perfect, so all buyers and sellers are aware of prices and product characteristics
  - Agreements are always enforced

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"Misconceptions of modern agricultural markets"

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Typical example: "*Thousands of farmers produce wheat, which thousands of buyers purchase to produce flour and other products. As a result no single buyer can significantly affect the price of wheat*."

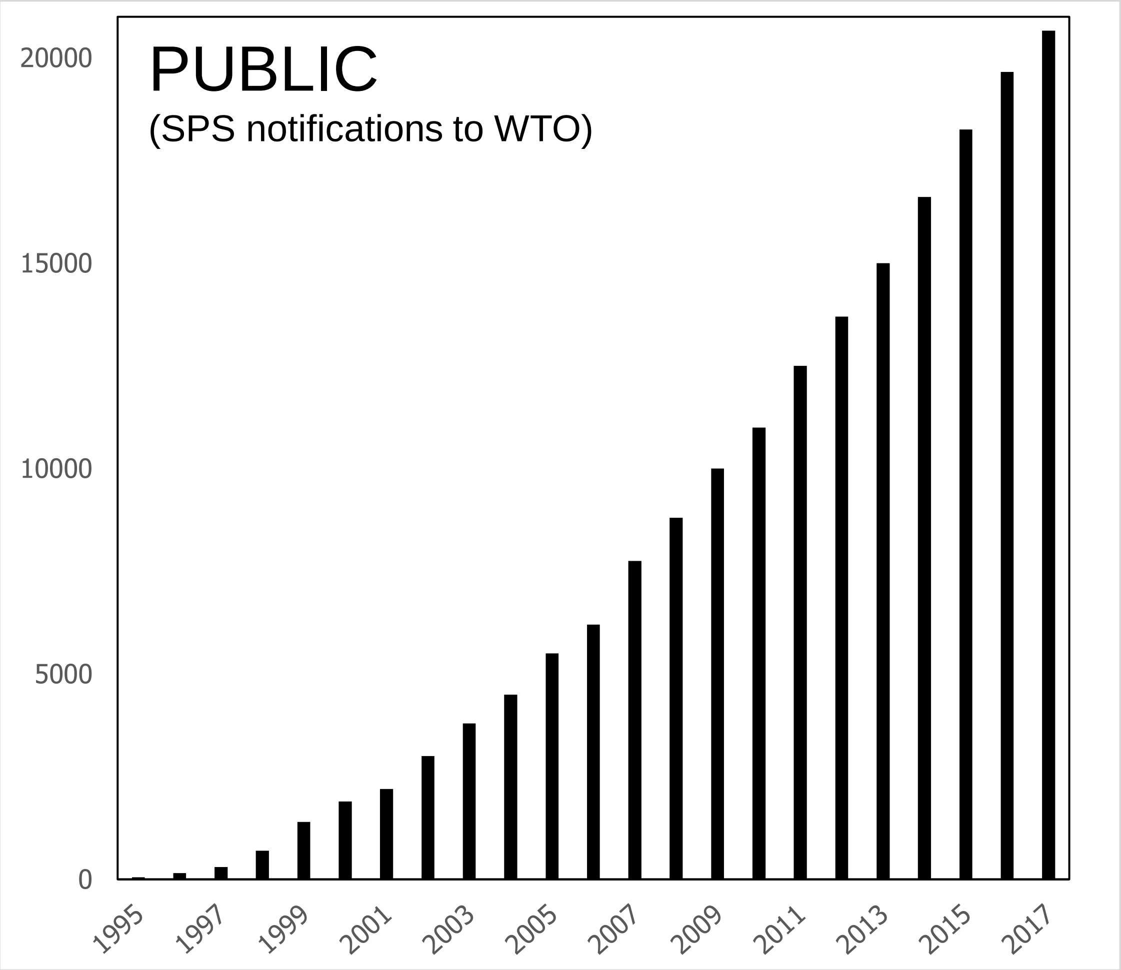
- Conditions for "competitive/perfect markets":
  - Buyers and sellers must be **many and small** relative to the total size of the market
  - Products must be **homogenous**
  - **Information** must be **perfect**, so all buyers and sellers are aware of prices and product characteristics
  - Agreements are always **enforced**

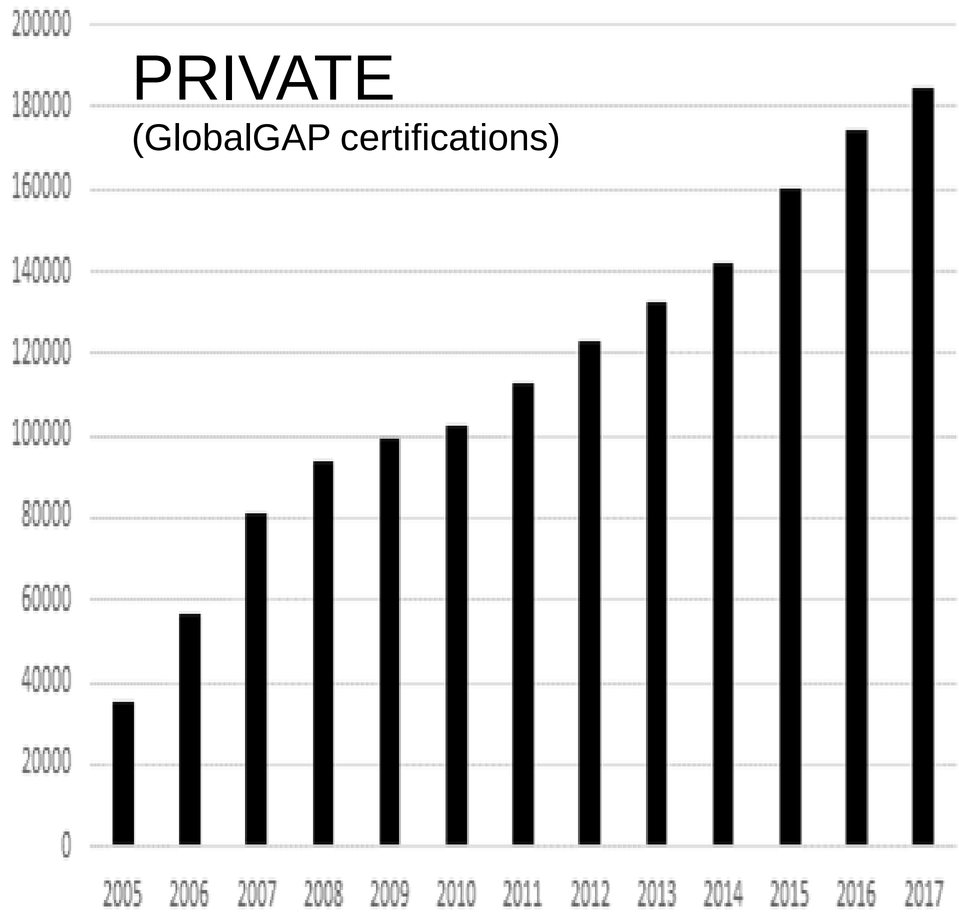
"I don't know of any modern agricultural market that meets all these conditions. Most don't meet any of them" (Sexton AJAE 2012)

What is exchanged ?

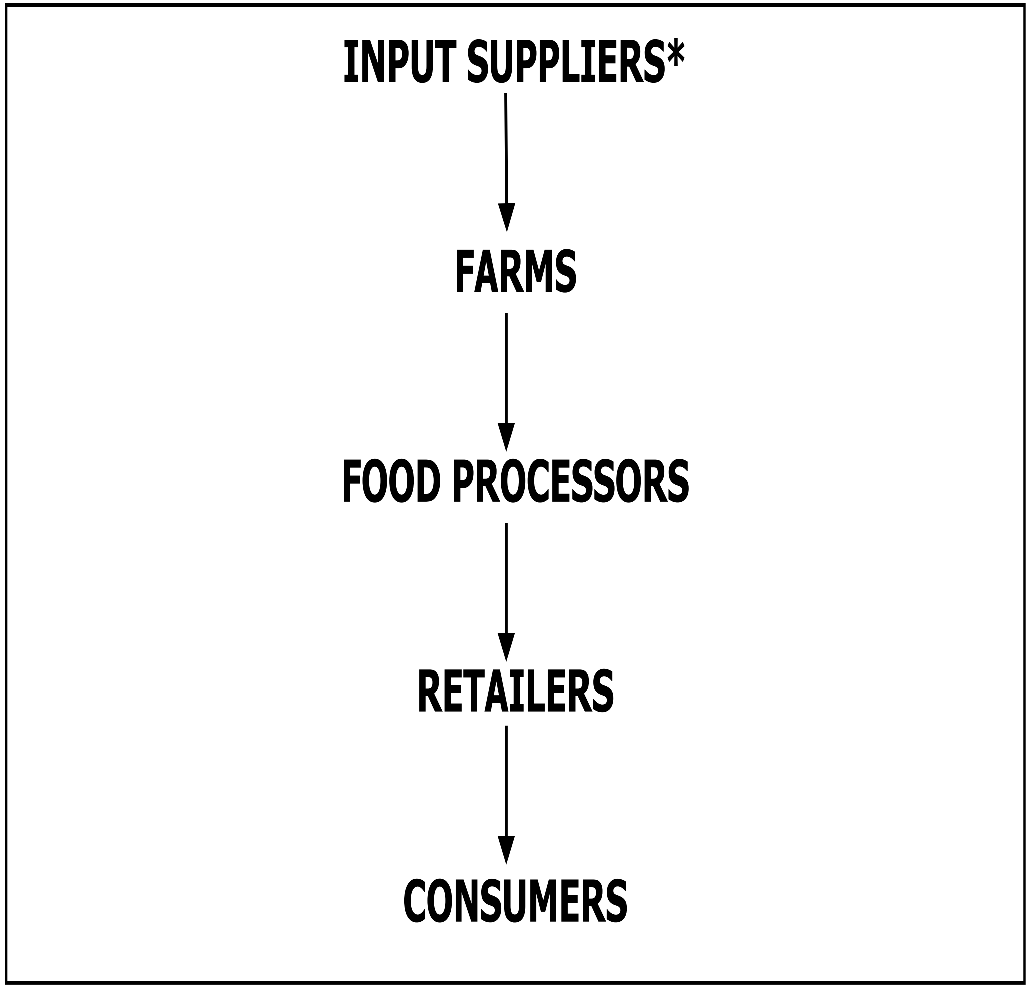
Safety and quality are always an issue, and have grown in importance

Global spread of food safety and quality standards 2000 - 2020





Who is selling and who is buying ?



Journal of Economic Literature 2022, 60(4), 1316–1377
https://doi.org/10.1257/jel.20201539

Agri-food Value Chain Revolutions in Low- and Middle-Income Countries†

Christopher B. Barrett, Thomas Reardon, Johan Swinnen and David Zilberman*

Agri-food value chains (AVCs) intermediate the flow of products between largely rural farmers, fisherfolk, or herders and increasingly urban consumers. The theoretical models that historically structured research on the economic development process assumed away AVC functions, however, and AVC firms and workers were necessarily omitted from the household data that generated most empirical findings in the agricultural and development economics literatures. As a result, the discipline has somewhat overlooked the rapid growth and structural change in AVCs over the past few decades that turned AVCs into major employers and sources of value addition, as well as key loci for technology transfer and foreign investment. This paper offers an integrated, structured, empirical narrative of how and why AVC revolutions occur in developing countries, the impacts of those changes, and the abundant economic research opportunities these structural changes afford economists. (*JEL* L14, L81, O13, O33, Q12, Q13, Q17)

1. *Introduction*

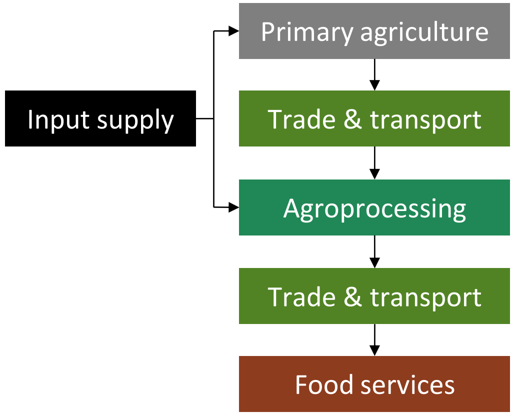
The economic development process invariably involves structural transformation. The narrative is familiar. A low-income agrarian economy, in which low-productivity agriculture employs most workers and generates most output—much of it for subsistence consumption—transitions to a higher-income, more industrialized, service-oriented, and diversified economy with a far more productive, but relatively much smaller agricultural sector

* Barrett: Cornell University. Reardon: Michigan State University. Swinnen: International Food Policy Research Institute. Zilberman: University of Cali-

Falcao Bergquist, Marc Bellemare, Channing Arndt, and four anonymous reviewers for helpful comments and discus-

Who is selling and who is buying ?

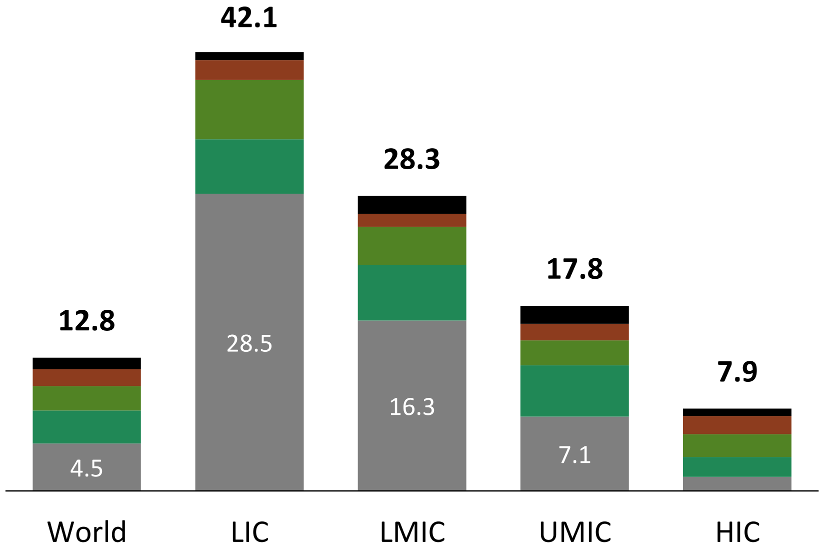
Global AVCs (Agrifood System)



AFS GDP = $11.7 trillion in 2021 (13% of global GDP | 62% in developing countries)
AFS employment = 1.3 billion workers in 2021 (38% of global workforce | 95% in developing countries)

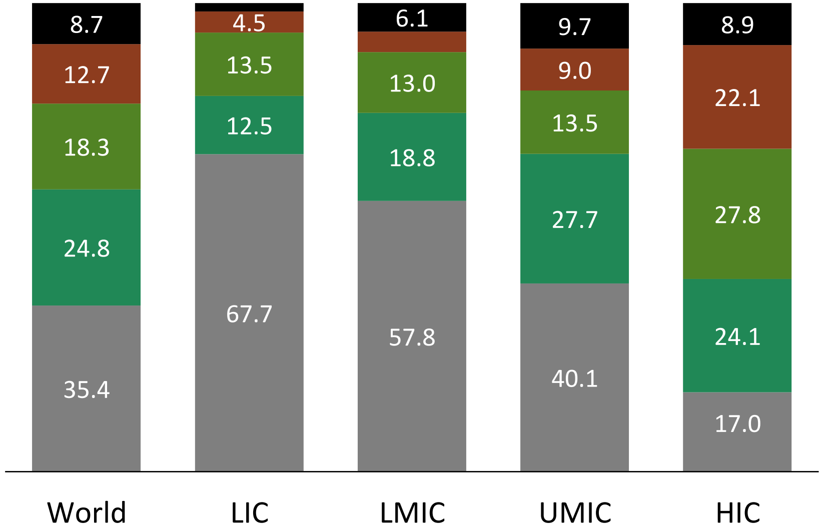
1 Share of total GDP in 2021 (%)

- Agriculture and the agrifood system contribute less to the overall economy in more developed countries



2 Share of agrifood system GDP in 2021 (%)

- Off-farm components are more important parts of the agrifood system in more developed countries



LIC = low-income | LMIC = low-middle | UMIC = upper-middle | HIC = high-income

Source: IFPRI Global Agrifood System Database of 217 countries (2023)

AVC Transformation

DRIVERS

- Income
- Urbanization
- Market-oriented policy reforms
- Globalization (global and domestic AVCs)
- Endogenous evolution of practices, standards, and technologies

IMPACTS

- Technology transfer and diffusion
- Competition, concentration, and market power
- Smallholder inclusion in value chains
- Employment and labor market impacts
- Real incomes, poverty, and food security

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Some Key Insights

- AVC transformation is a potentially important source of **agricultural growth** and **technology spillovers**
- Extent and organization of AVC **varies significantly** with economic conditions / standards / technology / commodity ...
  The IO structure is endogenous
- Inclusion of **smallholders** is mixed
- **Poverty** can be reduced through **multiple channels**
  - **Access** to inputs and markets
  - Efficiency **premia** for poor suppliers
  - **Employment** opportunities for poor households

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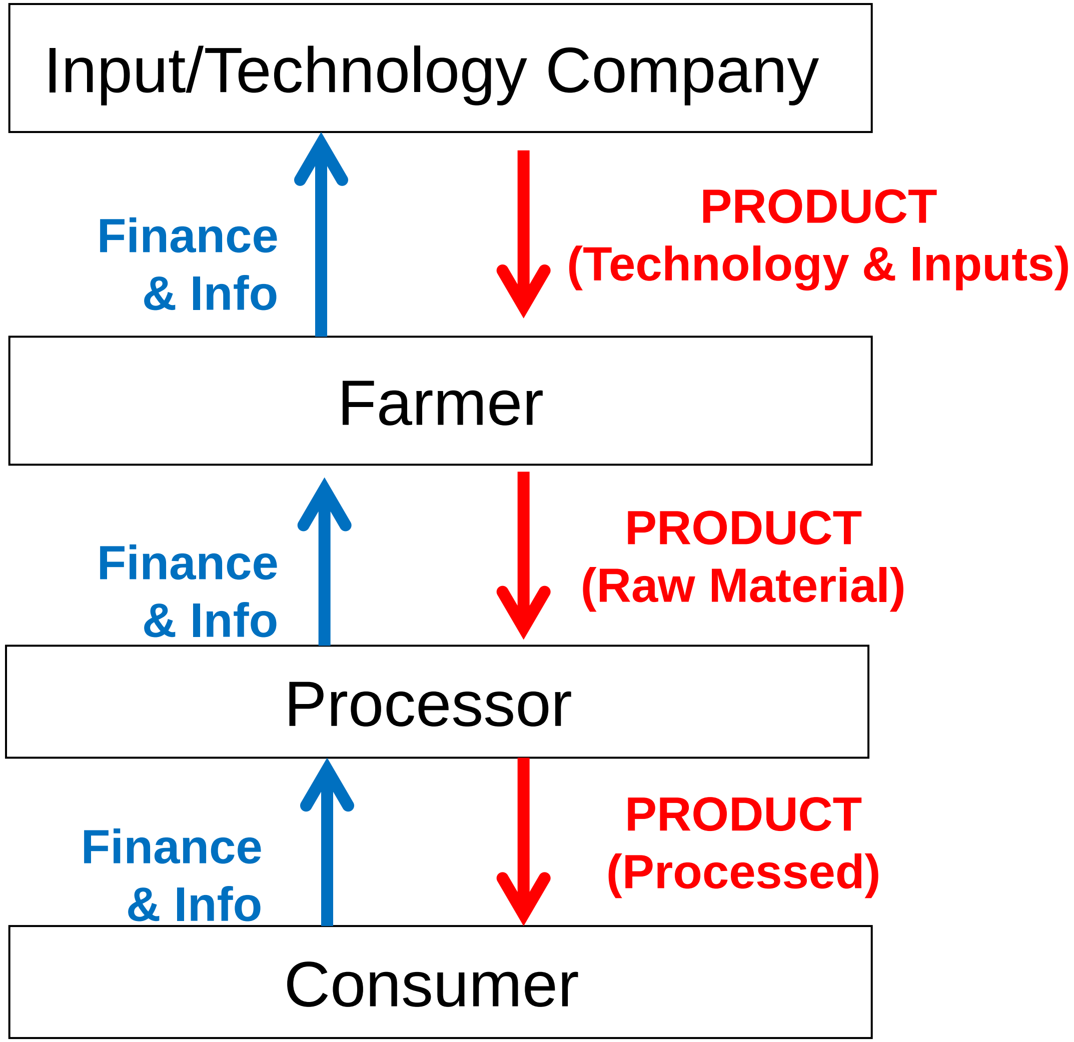
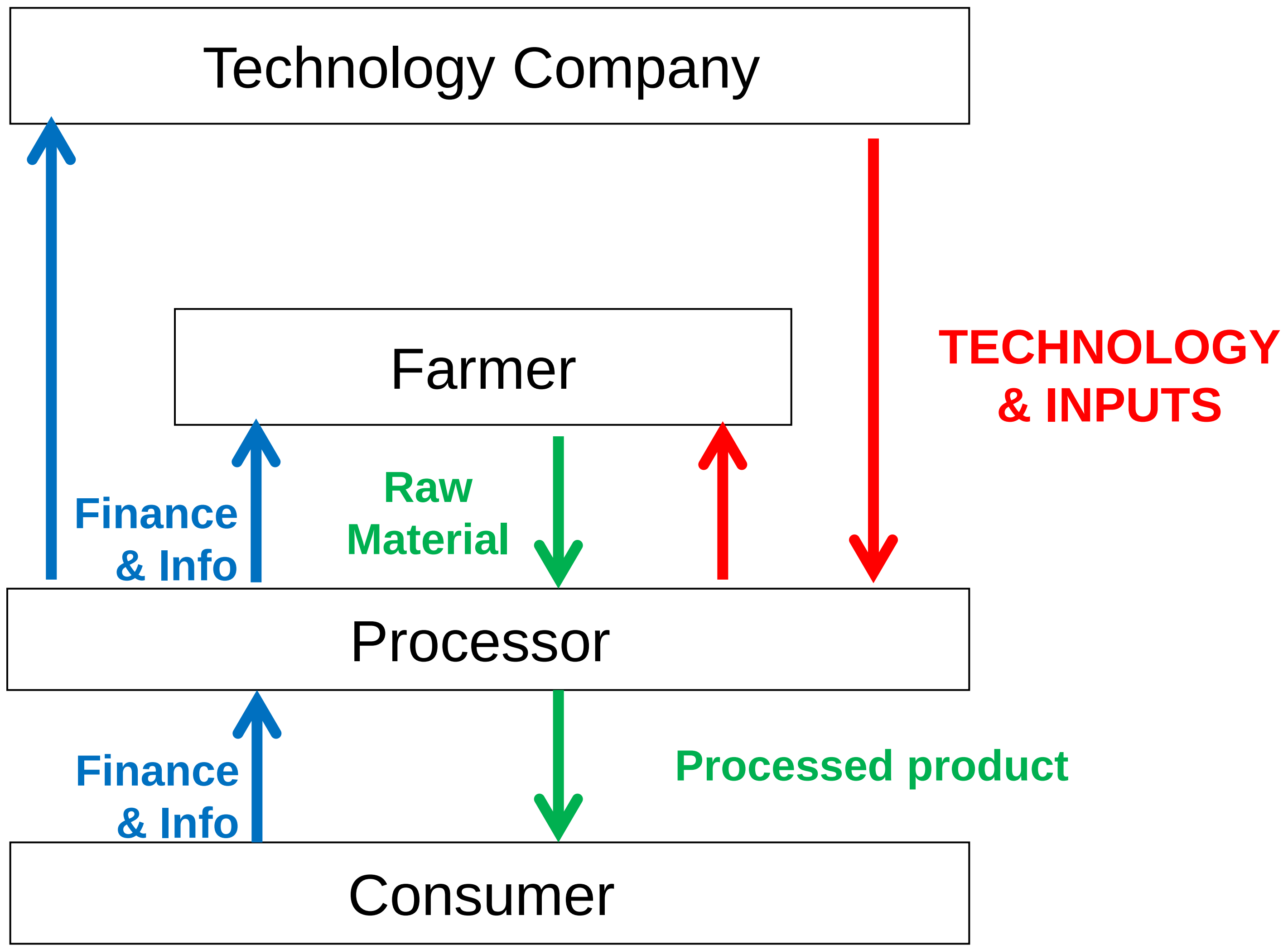
A simple value chain model



Value chain innovation 1



Value & Value Chain Structure

Commodity value, standards, market conditions

↓

Governance and institutional design of AVC

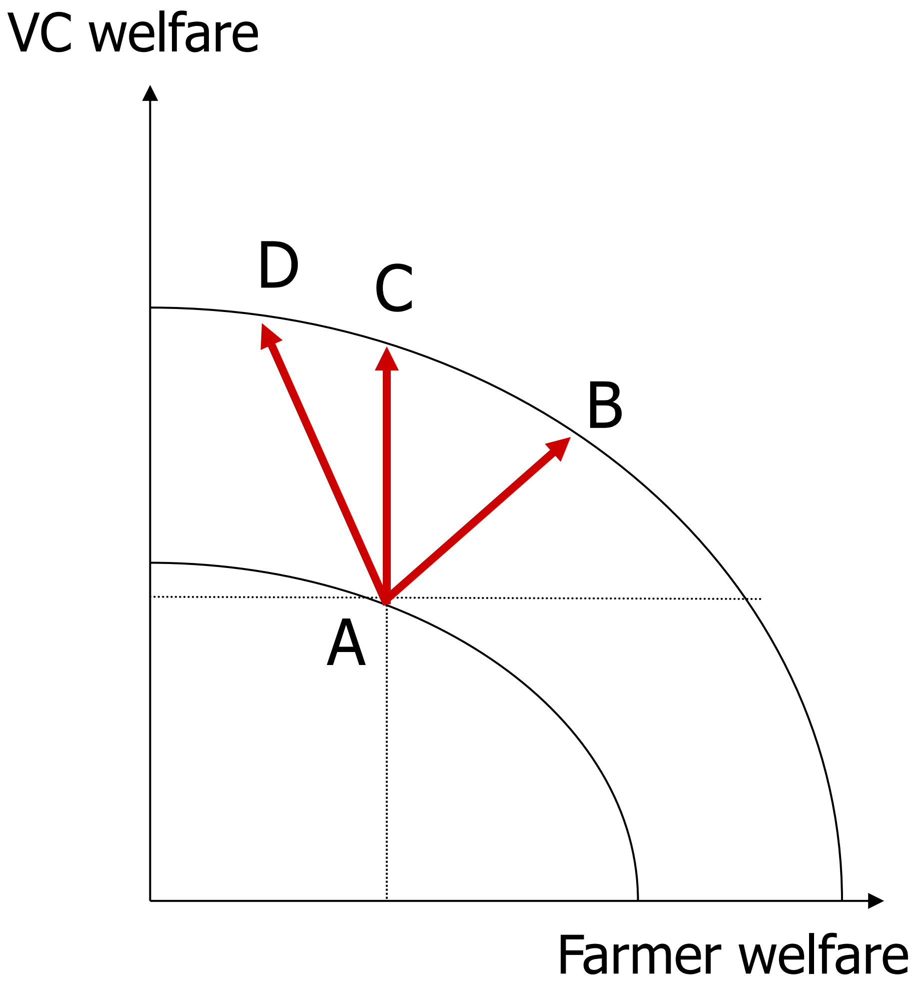
↓

Surplus Creation & Surplus Distribution along the Value Chain

E.g. with enforcement imperfections, commodity value will affect AVC structure (eg staples vs high-value commodities)

Inclusion and Sustainability

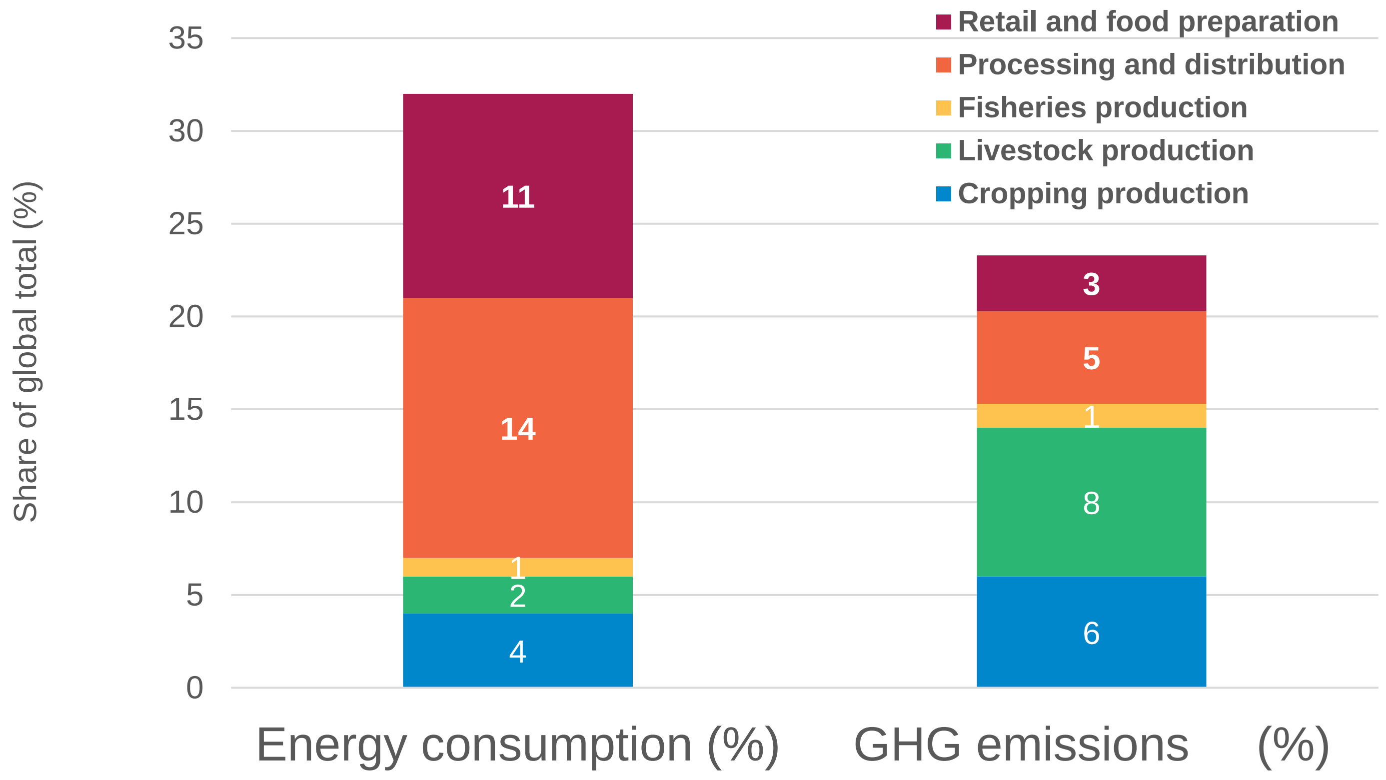
- In/out:
  - Smallholder **inclusion** is **mixed**
  - Benefits from **employment** (potentially important for less skilled/low-asset eg. the poorest and women)
- Distribution within:
  - Smallholders **can** have **significant benefits** if included, even with **concentrated** supply chains
  - Market power is endogenous



Climate change and food systems

- Two-way relationship
- Major cause
  - "Official recognition" only at COP-28
- Potential major (part of) solution
- Impacts are real now

The global food system consumes >30% of energy and produces >20% of GHG emissions



Source: EAT-Lancet Report 2019

AVC-driven food system transformation for climate change : sustainability and equity ?

Swinnen, Ronchi and Reardon (2024, Science):

- Size differentiation allows scale effects in CC and in Climate Finance
- Endogenous institutions induce technology adoption for mitigation and adaptation throughout the value chain
- Important lessons from safety and quality standards over past 20 years
- Size differentiation and vertical coordination may imply power imbalance in distribution of benefits
- Trade-off or synergy ?

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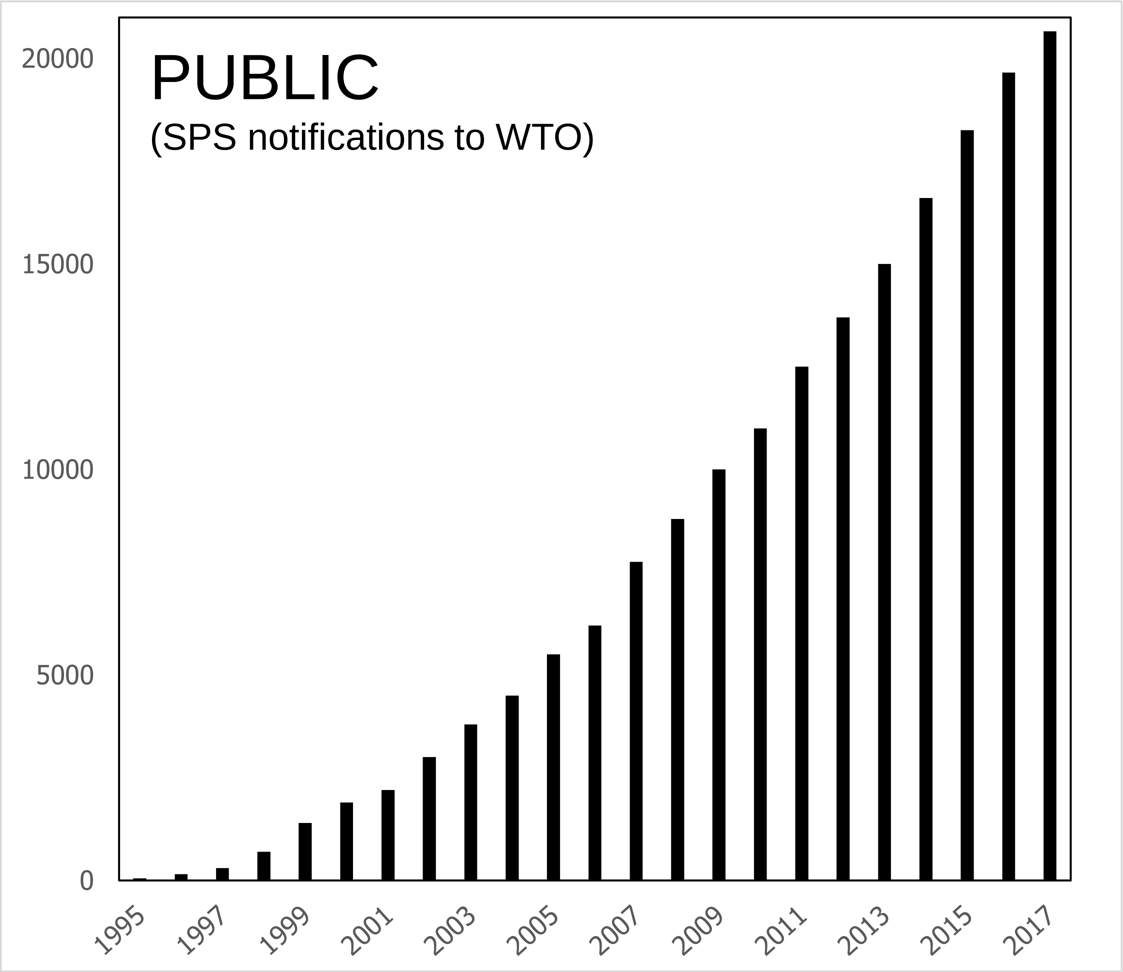
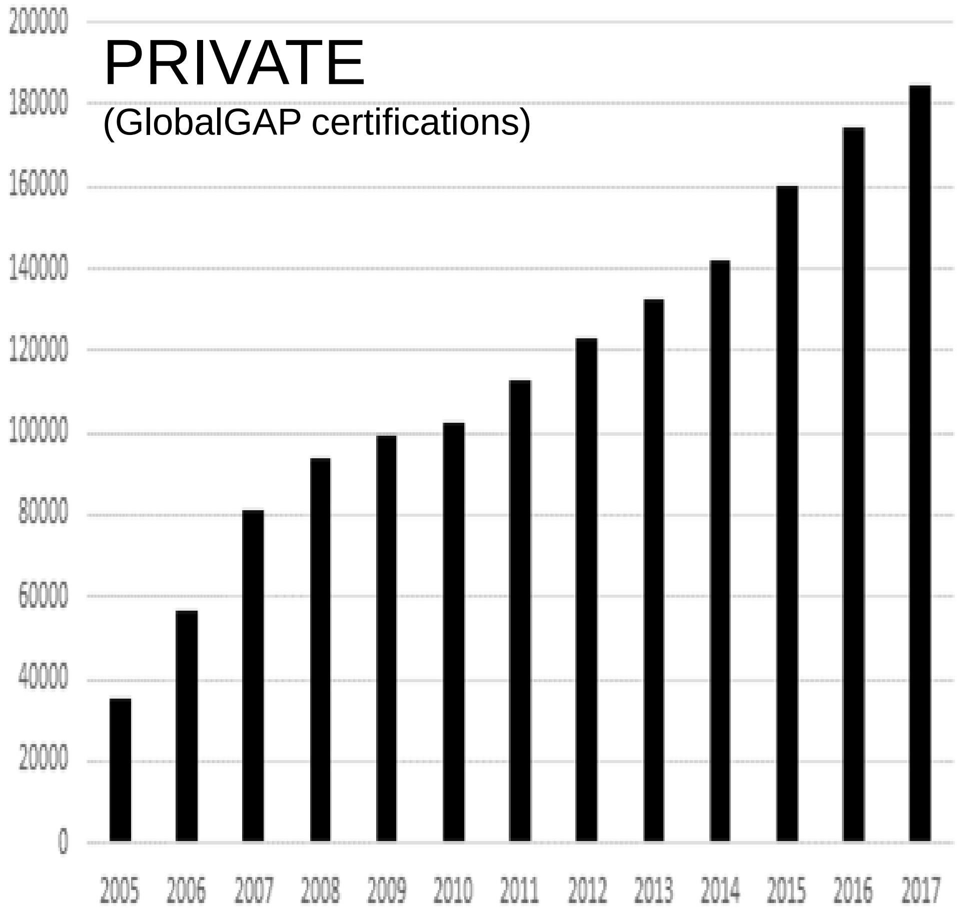
Global spread of food safety and quality standards 2000 - 2020

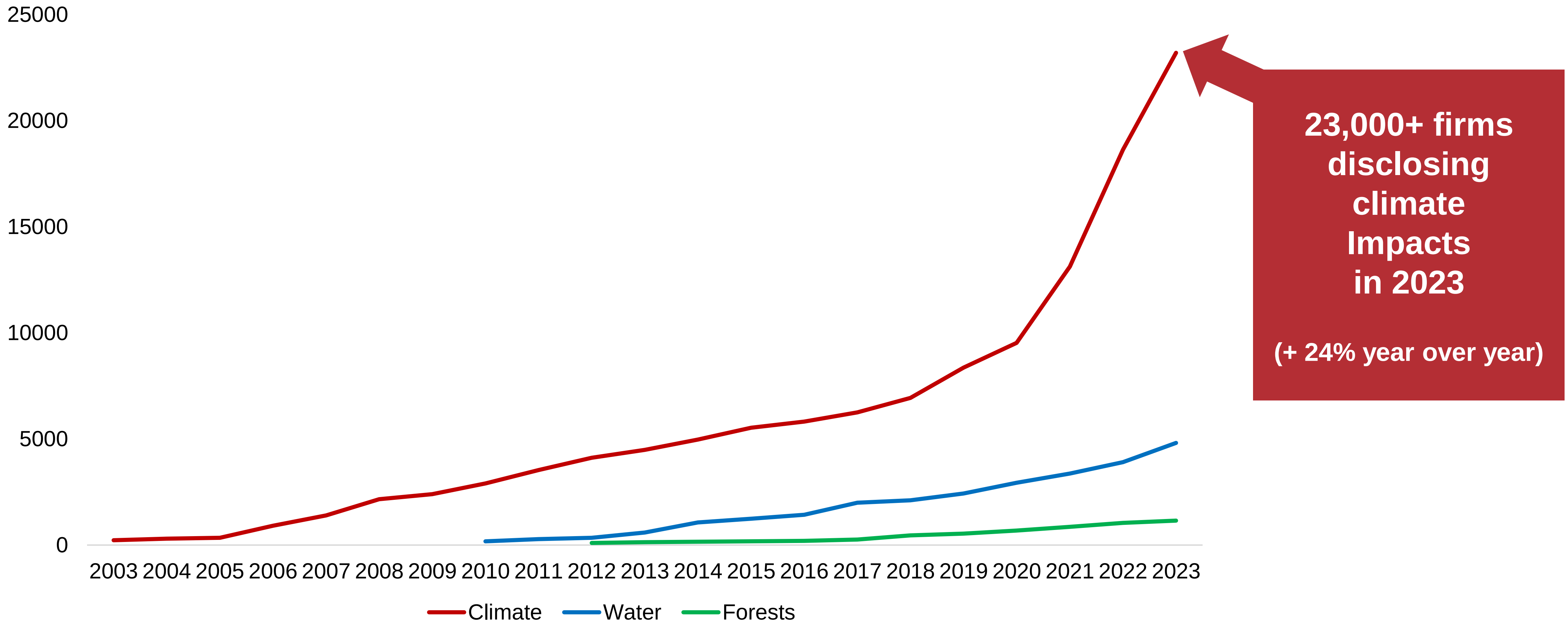




From safety and quality to sustainability:

Firms' disclosure of environmental impact information

Number of firms disclosing impacts through CDP



Source: Deconinck et al. 2023

From safety and quality to sustainability:

FAST and FURIOUS

Source: Deconinck et al. 2023

Large and small AVCs can spur climate-smart agriculture ?

- Sustainability standards help regulate larger firms involved in international trade but may not reach production for **domestic markets**
- Global South accounts for 73% of global agricultural output
  - **SMEs** represent 80-90% of AVC firms in Global South
- Majority of small farmers in Global South interact with input and output markets through SMEs
- SME firms in AVCs can **incentivize** farmers in LMICs to use sustainable farming practices


POLICY FORUM

AGRICULTURE

Harness agrifood value chains to help farmers be climate smart

Incentives and structures exist to improve farming practices

By Johan Swinnen[1], Loraine Ronchi[2], Thomas Reardon[3,1]

vide opportunities to address problems in accessing technologies, introducing man-

Source: Swinnen, Ronchi, & Reardon 2024

Policy for AVC-driven CC transformation

- Explicitly consider **AVC structures in relation to farmers**, the risks AVCs face, and the importance of incentives, including demand-side markets and regulatory compliance.
  - Enable and oversee **private-sector investment growth** in agrifood sector
    - Facilitate the internal incentives AVC firms have to require and help farmers be climate-smart
  - Regulate for **climate accountability** across whole value chain
    - Redirect existing “non-green” subsidies toward better information and traceability infrastructure support
  - Mitigate **private-sector risks** in new technology development
    - Direct public investment to early-stage innovation

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Source: Swinnen, Ronchi, & Reardon 2024

Policy for AVC-driven CC transformation

- **Public procurement and education programs** to increase consumer market for climate-friendly practices on farms and supply chains
- **Public R&D** to stimulate private R&D in innovations and technologies
- R&D and targeted government programs to bridge the gap between demand and supply in **climate finance** in AVCs
- Repurposing to invest and derisking programs
- Compensation and bundling policies to mitigate uncertainties and trade-offs (political economy)
- Competition policy and UTP regulations

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Source: Swinnen, Ronchi, & Reardon 2024

Re/Thinking Institutions of Exchange for Inclusive and and Sustainable Development

- Key general requirment and conditions need to be satisfied
- Specific optimal institutions will vary with commodity characteristics, economic structure, consumer preferences, etc.

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Thank you for your attention.

CGIAR | Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Plenary Session A

Improved logistics to reduce food losses, improve incomes and value-chain efficiency

Presentations:

Futoshi Yamauchi, IFPRI and Bedru Balana, IFPRI-Nigeria

Hyacinth Edeh and Bedru Balana, IFPRI-Nigeria

Moderator: *Ruth Hill, IFPRI*

Discussants:

Prof. Dauda Bawa, *Head - Department of Agricultural Economics & Extension University of Jos, Nigeria (Online)*

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CGIAR

INITIATIVE ON
Rethinking
Food Markets

Science, Innovation and Policy Symposium
December 10 &11, Washington DC

Impacts of Bundled Innovations for Cold Chain Development, Food Quality, and Food Loss Reduction in Nigeria’s Horticulture Value Chain WP2 Nigeria

Futoshi Yamauchi (IFPRI)

Bawa Dauda (Univ Jos), Bedru Balana, Hyacinth Edeh, Weilun Shi (IFPRI)

Horticulture in Nigeria

- Extremely heterogeneous
- Micronutrient rich
- Growing consumption and demand especially in urban area in **south**, while production hubs remain in **north**
- Significant employment potential along the VC
- Low **productivity** on farm
- Large **seasonal + spatial variations of supply**
- Significant **loss and waste** at post harvest stage (due to insufficient cold storage, packing methods and materials, cool transportation, varieties used, and poor infrastructure)
- Limited use of modern **processing** methods (due to insufficient and unreliable supply; imported high quality processed products)
- Weak/poor **market linkages** (coordination failure)

Innovation Types

Process innovation (new tech) –> loss reduction

- Off grid cooling that reduces loss
- Cool transportation
- Plastic crates

Product innovation (new product) –> quality enhancement

- Processing that adds values and reduces loss
- Improved seeds

Improved information and coordination

- Market information and linkages
- Certification and labels
- Logistics

Partnership – IFPRI, IITA and

- Wageningen University & Research [WUR] (seeds, research)
- East-West Seed [EWS] (seeds)
- World Vegetable Center (solar dryer, scoping work)
- ColdHubs (cool transportation, solar powered cold storage, plastic crates)
- University of Jos (cool transportation, solar powered cold storage, research)
- Nigerian Stored Products Research Institute [NSPRI] (solar dryer)
- Bunkasa (plastic crates, market linkages)
- Farmer groups and market unions (various, esp Jos, Bauchi, Gombe)
- Plant Health Initiative [PHI] (sola dryer)
- Government of Nigeria
- Government of Japan

RCT/Interventions

Intervention 1 – Improved seeds (WUR, EWS, IFPRI)

Innovations: (a) improved varieties and (b) signaling

Intervention 2 – Off-grid cooling: Cold storage (ColdHubs, Univ of Jos, IFPRI)

Innovations: (a) solar panels/battery + refrigeration, and (b) plastic crates

Intervention 3 – Off-grid cooling: Cool transportation (ColdHubs, Univ of Jos, Market Unions, IFPRI)

Innovations: (a) refrigeration + transportation, (b) plastic crates, and (c) labelling

Intervention 4 – Solar dryer (processing) (WorldVeg, NSPRI, IITA, IFPRI, and PHI)

Innovations: (a) solar dryer, (b) labeling, and (c) marketing/contract

Intervention 5 – Plastic crates (Bunkasa, IITA, IFPRI)

Innovations: (a) plastic crates and (b) market information/linkage

Cool Transportation (Intervention 3)

- Refrigeration/plastic crate to reduce loss/preserve quality - **process innovation**
- Transportation/truck to spatially connect - **process innovation**
- Labels to improve information - **information innovation**
- Tomato

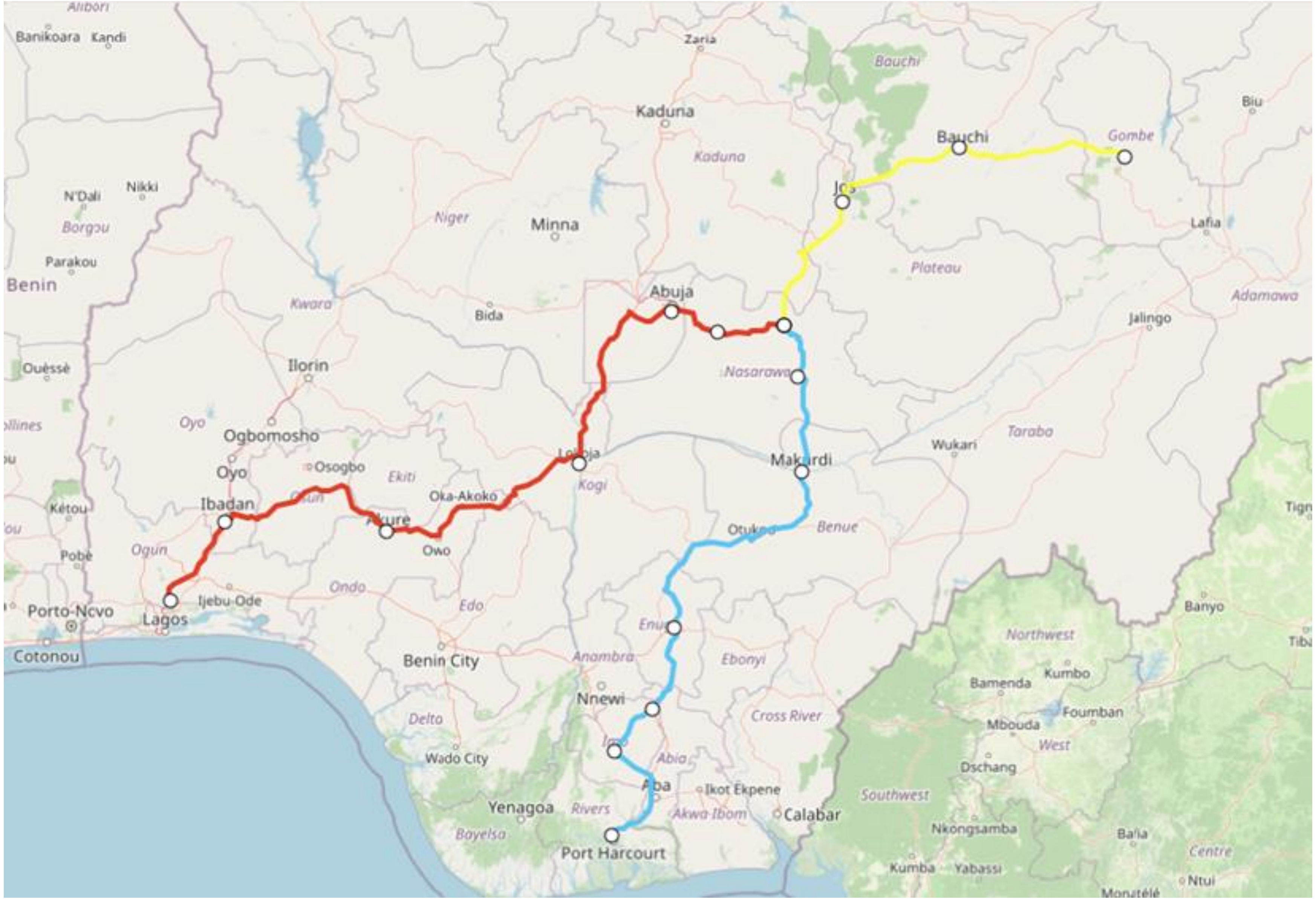
Routes

Origin markets

- Jos
- Bauchi
- Gombe

Destination markets

- Lagos
- Port Harcourt



Experiment

Design

- Baseline sample: marketers at Jos, Bauchi, Gombe markets (**n = 600**)
- RCT participants: those who are interested (**n = 331**)
- Randomly assign treatment: a group of **8 marketers** per round to use truck
- 5 groups: **A, B, C, D, E**
- Rotating over rounds
- A round = 5 to 7 days
- Total 15 rounds
- Follow up data collection at the end of each round

Round	DATE	Destination	Treatmet	Control				Pure Control
1st	2/21/2024	Lagos	D	A	B	C	E	
2nd	3/3/2024	Lagos	A	D	B	C	E	
3rd	3/10/2024	Lagos	C	A	B	D	E	
4th	3/21/2024	Lagos	E	A	B	D	C	
5th	10/12/2024	Lagos	B	A	C	D	E	
6th	10/19/2024	PortHarcourt	C	A	B	D	E	
7th	10/29/2024	PortHarcourt	D	A	B	C	E	
8th	11/2/2024	PortHarcourt	A	D	B	C	E	
9th	11/9/2024	PortHarcourt	B	A	C	D	E	
10th	11/16/2024	PortHarcourt	E	A	B	D	C	

Experiment

Operational arrangement

Phase 1 February - March

- Private business partner, ColdHubs Inc, operated for the pilot experiment
- *The project borrowed their trucks*
- *Rent (implicit)*

Phase 2 October - December

- IFPRI/Univ Jos/Market Unions operate for ourselves
- *The project bought and owns new trucks*
- *No rent*

Baseline

Almost no marketers use cool transportation or cold storage

- Only 2% of the sample marketers cool transport products; 0% in Jos, 4.5% in Bauchi, 1.5% in Gombe.
- Only 0.5% of the marketers store products in cold storage; 1% in Jos, 0% in Bauchi, 1.5% in Gombe.

Many marketers use non-cool transportation in Jos and Gombe

- In Jos and Gombe, nearly 70% and 64%, respectively; only 15% in Bauchi.

In Bauchi, many marketers own storage

- More than 80% of the marketers in Bauchi own storage; only 14.5% and 27.5% in Jos and Gombe, respectively.

Participants, those who want to participate in the experiment, are self selected.

Treatment and control groups are statistically comparable.

Three markets

Variable	All markets	Jos	Bauchi	Gombe
Position (owner)	99.17	97.5	100	100
Used cold storage	27.67	11.5	51.5	20
Using cold storage now	4.67	3.5	7	3.5
Is commission agent	67.83	93.5	50	60
Is Wholesaler	91.33	82	93	99
Grow crops by self	32.83	45.5	23.5	29.5
Sell in other markets	62.17	58	78	50.5
Crop sole ownership(%)	93.67	96.5	85.5	99
Selling experience (years)	16.79	16.44	15.99	17.94
Producing experience (years)	3.24	4.68	1.76	3.29
Is member of trade association	91.5	79.5	99	96
Sell tomatoes	60.33	86	19.5	75.5
Quantity of tomatoes sold (kg)	7910.58	12215.01	3647.69	4108.52
Purchase from someone	53.5	67	19.5	74
Cool transport	2	0	4.5	1.5
Cold storage	0.5	1	0	0.5
Non-cool transport	49.5	70	15	63.5
Own storage space	41.17	14.5	81.5	27.5
Storage space (tons)	24.09	5.66	34.96	1.56
WTP for cool transport	1592.14	1884.64	1341.9	1549.9
Estimated current price (per crate)	9025.5	7824	10767.5	8485
Estimated transportation capacity (crates)	129.32	146.32	91.42	150.22
Expected price (per crate)	26206.67	26030	28410	24180
Concerned about transportation loss	99.83	100	99.5	100
Willingness to participate	55.17	64	46.5	55
Number of observations	600	200	200	200

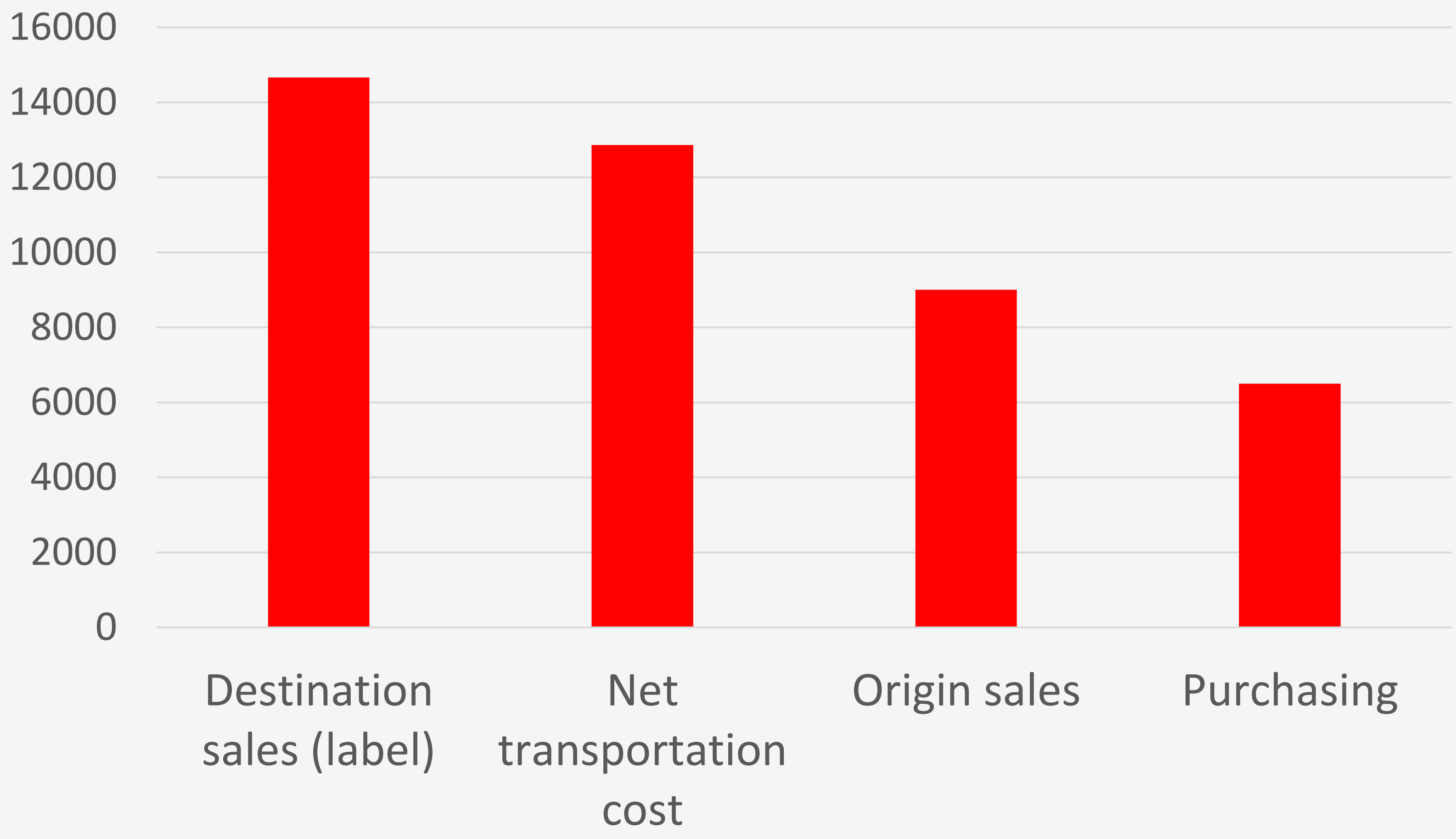
Balance

Variable	Mean	Treatment	Control	Participants	Non participants
Position (owner)	99.17	97.5	99.05	98.49	100**
Used cold storage	27.67	36.67	27.49*	30.82	23.79*
Using cold storage now	4.67	5.83	5.69	5.74	3.35
Is commission agent	67.83	69.17	71.09	70.39	64.68
Is Wholesaler	91.33	85	86.26	85.8	98.14***
Grow crops by self	32.83	26.67	28.91	28.1	38.66***
Sell in other markets	62.17	57.5	55.92	56.5	69.14***
Crop sole ownership (%)	93.67	99.17	97.63	98.19	88.1***
Selling experience (years)	16.79	17.48	18.22	17.95	15.36***
Producing experience (years)	3.24	2.55	2.94	2.8	3.8**
Is member of trade association	91.5	86.67	88.63	87.92	95.91***
Sell tomatoes	60.33	55.83	63.98	61.03	59.48
Quantity of tomatoes sold (kg)	7910.58	7701.19	8749.84	8402.02	7290.12
Purchase from someone	53.5	49.17	56.4	53.78	53.16
Cool transport	2	0.83	1.9	1.51	2.6
Cold storage	0.5	2.5	0*	0.91	0*
Non-cool transport	49.5	42.5	51.66	48.34	50.93
Own storage space	41.17	34.17	31.75	32.63	51.67***
Storage space (tons)	24.09	20.55	25.43	23.57	24.48
WTP for cool transport	1592.14	1454.17	1584.49*	1537.24	1659.7**
Estimated current price (per crate)	9025.5	8795.83	8317.54	8490.94	9683.27***
Estimated transportation capacity (crates)	129.32	161.17	167.89	165.45	84.86***
Expected price (per crate)	26206.67	25570.83	23741.71*	24404.83	28423.79***
Concerned about transportation loss	99.83	99.17	100	99.7	100
Willingness to participate	55.17	100	100	100	0
Number of observations	600	120	211	331	269

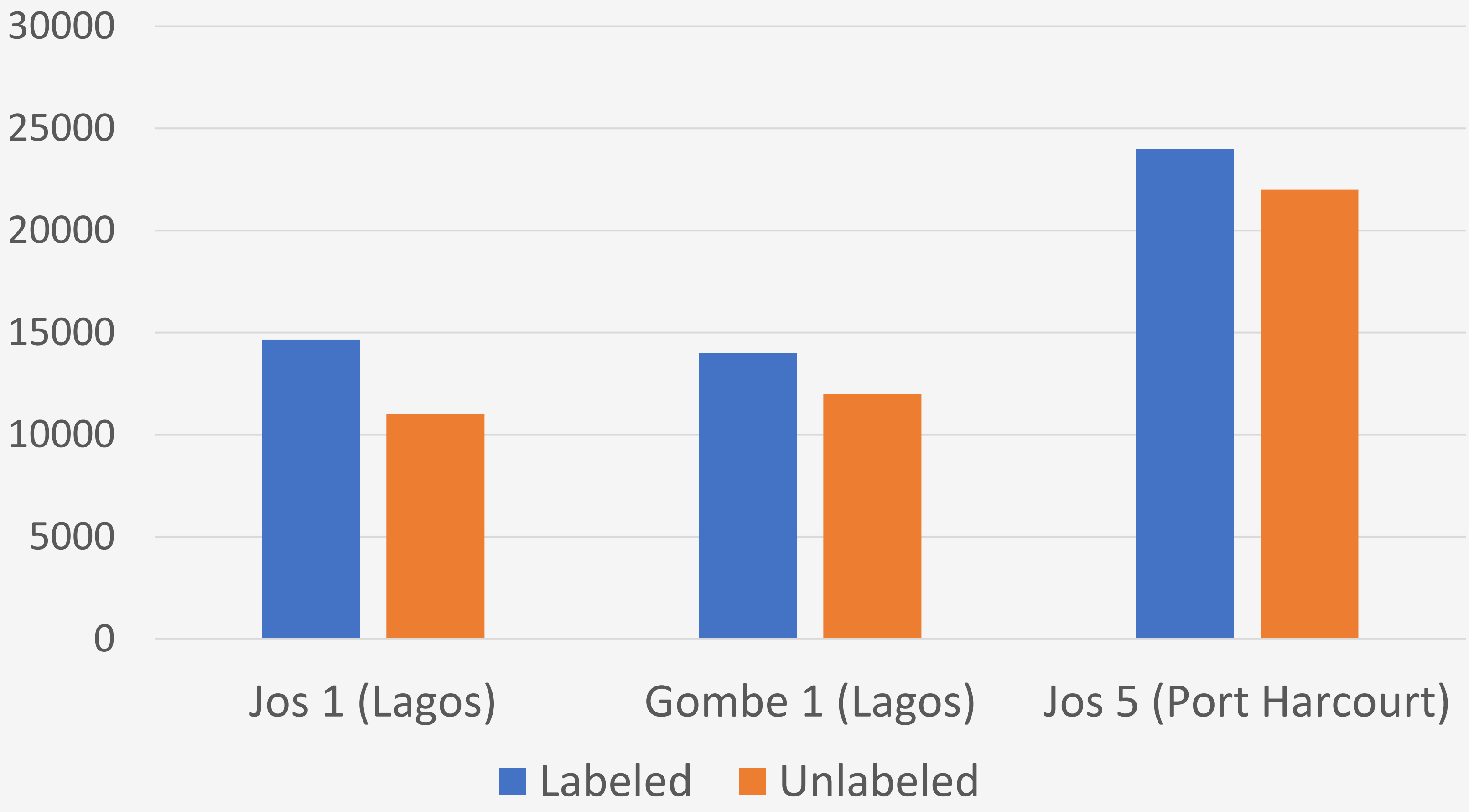
Rounds

	Jos	Destination		Bauchi	Destination		Gombe	Destination	
1st	03/16	Lagos	D	11/15	Port Harcourt	D	02/21	Lagos	D
2nd	10/10	Lagos	A	11/22	Port Harcourt	A	03/03	Lagos	A
3rd	10/17	Port Harcourt	C	11/29	Port Harcourt	C	03/10	Lagos	C
4th	10/24	Port Harcourt	E	12/06	Port Harcourt	E	03/21	Lagos	E
5th	10/31	Port Harcourt	B	12/13	Port Harcourt	B	10/12	Lagos	B
6th	11/07	Port Harcourt	C	12/20	Port Harcourt	C	10/19	Port Harcourt	C
7th	11/14	Port Harcourt	D			D	10/26	Port Harcourt	D
8th	11/21	Port Harcourt	A			A	11/02	Port Harcourt	A
9th	11/28	Port Harcourt	B			B	11/09	Port Harcourt	B
10th	12/05	Port Harcourt	E			E	11/16	Port Harcourt	E
11th	12/12	Port Harcourt	E			E	11/23	Port Harcourt	E
12th	12/19	Port Harcourt	C			C	11/30	Port Harcourt	C
13th			D			D	12/07	Port Harcourt	D
14th			B			B	12/14	Port Harcourt	B
15th			A			A	12/21	Port Harcourt	A

Returns to Cool Transportation (Jos - Lagos, 1st Round)



Labeling - Better information creates premium



Impacts (preliminary midpoint analysis)

Variables	Sales price (control: non-cool)	Sales price (control: origin market)	Revenue (cool & non-cool)	Profit (cool & non-cool)
	Coefficient (std.err)	Coefficient (std.err)	Coefficient (std.err)	Coefficient (std.err)
Cool transportation	7757.65*** (294.42)	11023.45*** (374.77)	757206.8*** (75500.6)	445495.1*** (42156.9)
Market Agent Fixed Effects	Yes	Yes	Yes	Yes
Market Round Fixed Effects	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
Sample-size	822	457	622	689
% Increase	53.72	111.81	81.59	255.82

Difference in sales price **29.6% - Reallocation, i.e., origin to destination markets**
70.4% - Quality preservation, i.e., cooling to keep fresh (no loss)

Economics of Cool Transportation

Marketers and business partner are both middlemen in the value chain

Imperfect information

- Market prices: destination markets, near perfect though dynamically changing
- Product/quality: asymmetry between origin and destination markets

Incentives

- Profit maximization: both business partner and marketers
- Moral hazard: hidden actions - mainly, truck operation

Contract/Sequential game

- Principal-agent: which player is principal, marketers or business partner
- Alternatives (reservation):
    - Business partner (truck) - many locations/users
    - Marketers - not many options other than non-cool transportation
- Internalization: marketers want to integrate vertically; business partner may contract farmers
- Discount factor: marketer << business partner

Credit constraint

- Large fixed cost - who can invest in truck?

What was seen

Perfect information: marketers know market prices at potential destinations

- Business partner has no informational advantage

Moral hazard: business partner tends to, for example

- Overcharge, e.g., fuel cost (money loss)
- Divert trucks to different routes for other purposes (time loss)
- Mismanage temperature (can cause total loss of tomatoes)
- Lack proper maintenance (can cause total loss of tomatoes)

Contract/MOU is enforceable or not: business partner can easily go away with truck

A credible threat from marketers to us - get out of the project if business partner stays

Game changer

- **IFPRI bought/owns 3 new trucks (Phase 2)**

Marketers, if technically supported, can take over and manage cool transportation

- Efficiency gain (more efficient logistics and more reduction of food loss)
- Redistribution (more profits to marketers and potentially more jobs)

What was missing was not another player in the middle, but just trucks

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More Inclusive Business Models for Cold Chain Logistics: Challenges and Opportunities

WP2 Nigeria

Hyacinth Edeh and Bedru Balana
International Food Policy Research Institute (IFPRI)

Business Setup:
Exclusive Private Partnership Model

The Rationale................

Efficiency

- Operations, including resource use & time management
- Customer relationships, including service delivery and integration through training

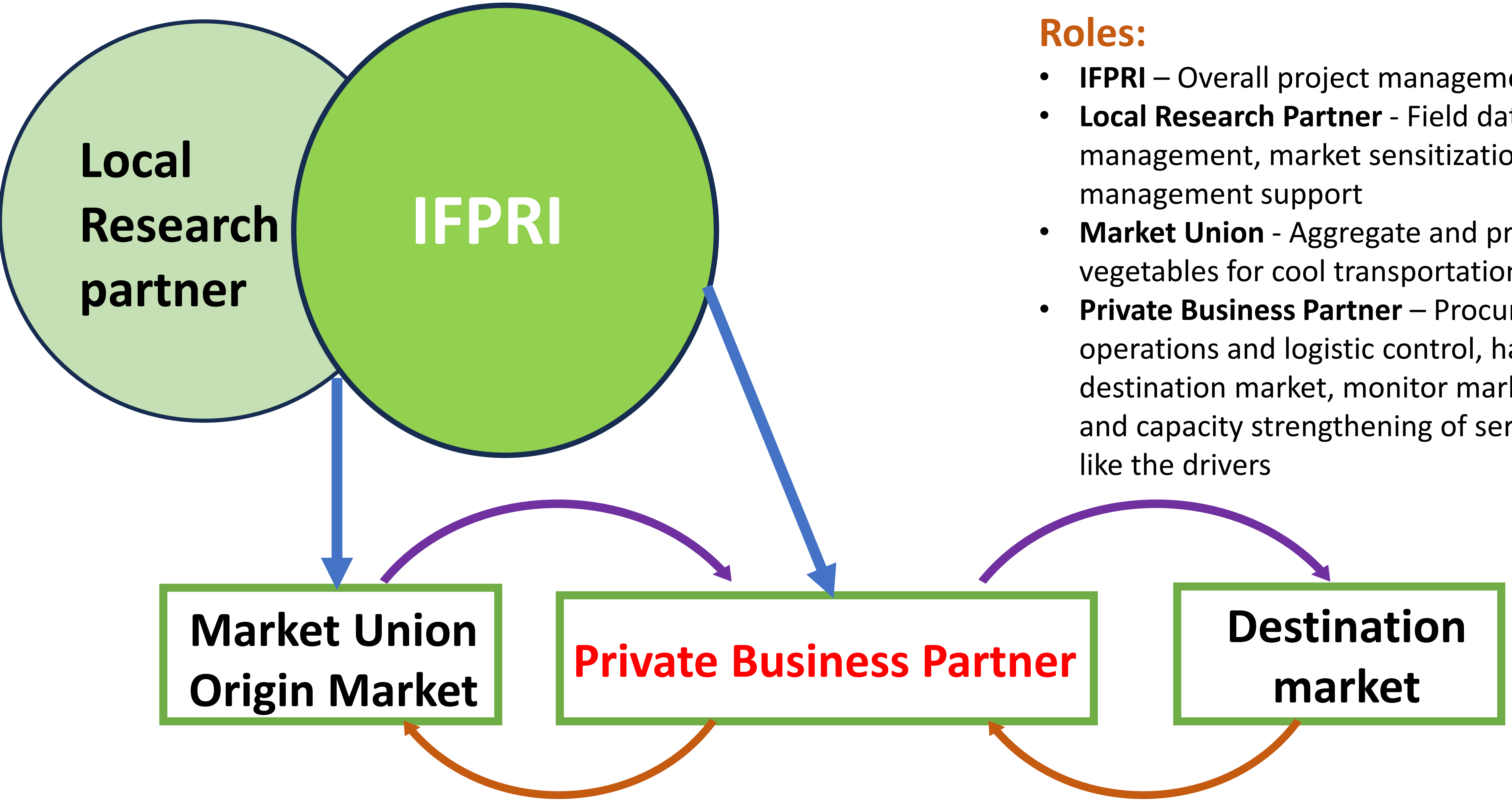
Better Business Knowledge

- Market dynamics – prices and spatial demand
- Infrastructure, including use of IT Platform

Research – Business Nexus

- Understand core research objective
- Research – business integration

Business Setup: Exclusive Private Partnership Model



Roles:

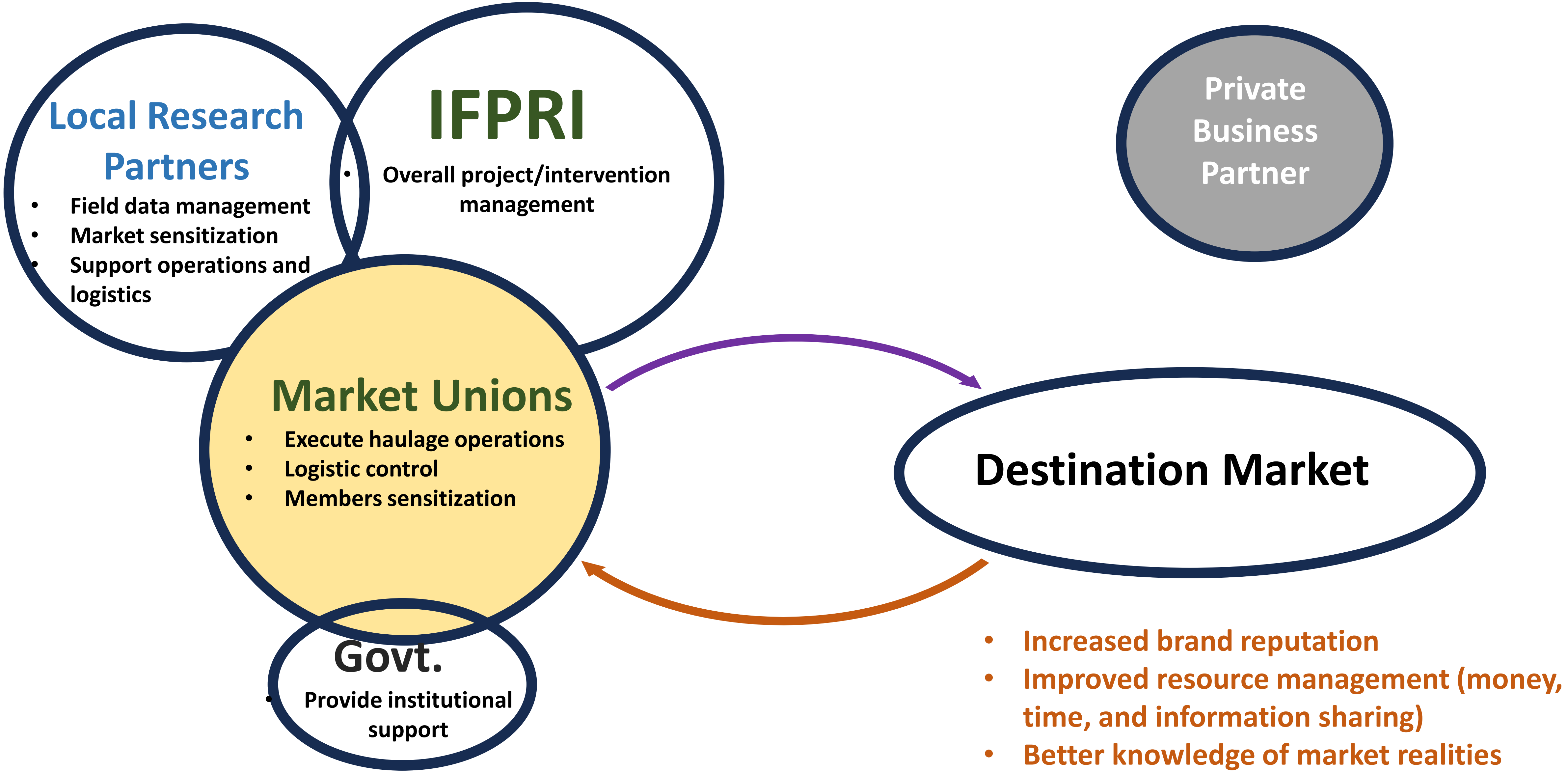
- **IFPRI** – Overall project management
- **Local Research Partner** - Field data management, market sensitization, project management support
- **Market Union** - Aggregate and provide vegetables for cool transportation
- **Private Business Partner** – Procurement, operations and logistic control, haulage to destination market, monitor market dynamics, and capacity strengthening of service providers, like the drivers

Business Setup:
Exclusive Private Partnership Model

Did This Model Work? The Pitfalls..........

Divergent objectives
Partner exclusion
Inefficient management
Poor communication
Technical inefficiency
Moral hazard (lack of transparency)

More Inclusive Vertical Operational Business Model



Challenges

❖ Operational

- Infrastructure – related issues
  - Inadequate and poor-quality roads (~30% of paved road, World Bank, 2024)
- Production issues
  - Mostly rainfed (w. limited irrigation)
  - Short growing time (~3-4months)
  - Seasonal variation (nearly zero production between March and July) and surplus in other months
- Insecurity

❖ Policy

- Multiple (federal and sub-national) taxation - produce permits
- High import duty and associated complications
- Bureaucracy in government institutions
- Finance – limited access and high interest rate

❖ Macroeconomic issues

- Volatile exchange rate
- High inflation
- Fuel subsidy removal

Opportunities

Policy support

- National Agricultural Technology and Innovation Policy (NATIP), 2022 – 2027 (Tomatoes)
- Nigeria's Medium Term National Development Plan, 2021 - 2025 (tomatoes, poultry, fisheries & dairy VC)
- Renewed Hope Agenda for Agriculture and Food Security: Boost nutritious foods production and construct cold storage facilities.
- Government support/buy-in (*including possible scalability*) (RFM Workshop Nigeria, 2024)

Economic Policy

- **Tax cut/subsidy for cooling, incl refrigerating trucks** (they are not only transporting, but importantly reducing food loss & preserving food quality)

Large market

- **Large population** (~ estimated at 234million)
- **Demand** (~2.45million MT) **– supply gap (**~1.8million MT)
- Most **commonly** used vegetable in diets (~18% of daily vegetable consumption); Dietary and health awareness of nutritious foods

More investors in nutrition-focused horticulture interventions

- Horti Nigeria

Limited # actors within cold transportation business

Thank you for listening

BREAK

11.00 → 11.30

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Parallel Session 1

Digital innovations for product tracing and making market information accessible - I

Presentations:

- ***Sudha Narayanan, IFPRI-Delhi***
- ***Federico Ceballos, CIAT-Honduras & Jenny Wiegel, Alliance Bioversity-CIAT, Nicaragua***

Moderator: *Kate Ambler, IFPRI*

Discussants:

- **Guillermo Alvarado**, *Secretary General, Honduran Chapter of the Global Coffee Platform*
- **Daniel Dubón López**, Secretary General, PROMECAFE (Online)
- **Brian King**, *Senior Manager at the Technology Integration office of the Alliance of Bioversity and CIAT*
- **Liaquat Ali Choudhury**, *Policy Adviser & Director, Bangladesh Shrimp and Fish Foundation (Online)*

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Cluster panacea?

Evidence of three interventions on smallholder shrimp farmers in Bangladesh

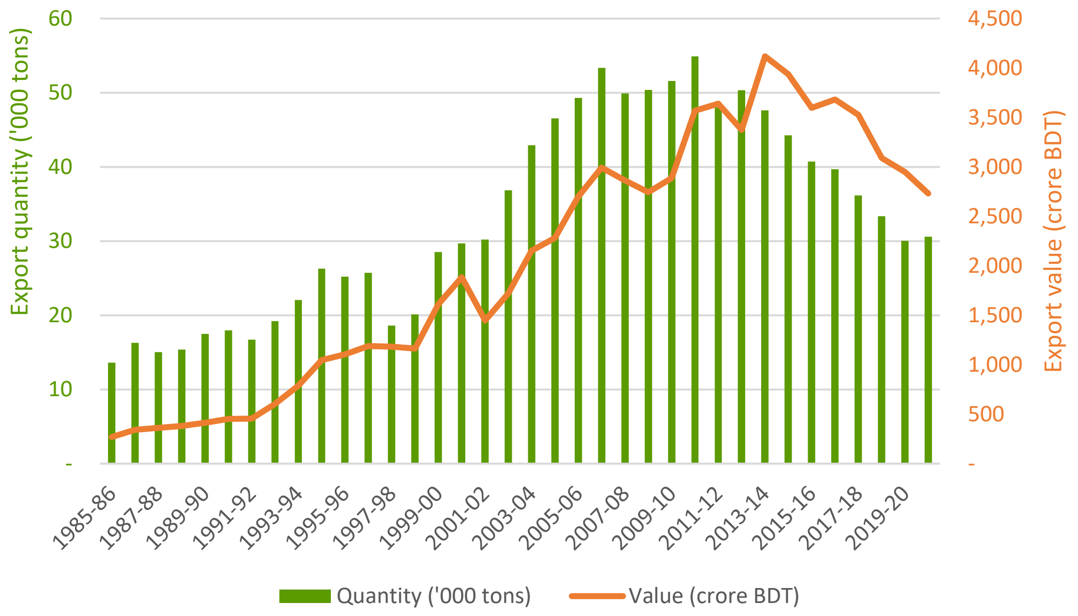
Sudha Narayanan
(with Ben Belton, Razin Kabir, Abdul Sakil, Ricardo Hernandez)

Rethinking Food Markets for Inclusion and Sustainability
Science, Innovation and Policy Symposium
December 10, 2024

The flailing shrimp sector in Bangladesh

- Checkered history: main agricultural export, **reversal of growth** in recent years.
- **Certification requirements** for supermarkets in importing countries (e.g. BAP in the US and ASC in the EU). Most exports go into food service and niche ethnic markets in Europe.
- **Traceability and certification initiatives face challenges** hundreds of thousands of small polyculture farms and tens of thousands of small traders.

Annual frozen shrimp and prawn exports from Bangladesh, 1985-86 to 2020-21



Source: Yearbook of Fisheries Statistics of Bangladesh, DoF, several years.
Note: Quantities and values are reported by fiscal year. In Bangladesh, the fiscal year runs from July to June.

Identification of “innovations”

- **CGIAR Rethinking Food Markets Initiative** in Bangladesh:
  - WP1 – Global (export-oriented) Value Chains – in Bangladesh, focus on black tiger shrimp (*P. monodon*, locally known as *bagda*)
  - Innovations aimed at improving livelihoods of smallholders and improving access to export markets
- Stakeholder consultation in 2023 identified **farmer cluster formation** as most significant shrimp value chain intervention in Bangladesh
  - Several public and private sector interventions in this area
  - All targeting small farmers (<1 ha. ponds)
- Clusters presumed to reduce transaction costs for extension services, training and marketing, enhance bargaining power, and facilitate certification
  - Yet, surprisingly, only limited understanding of whether they are effective

Intended transformation via clusters

Contiguous cluster *ghers* (ponds)

The 3 cluster models : Bundled, heterogenous design and uptake

Features	DoF	BSFF	ACI
Description	Clustering ponds; Deepening ponds; Training; Encourage use of SPF-PL; Financial support for graduated clusters; Traceability	Clustering ponds; Deepening ponds; Training; Provide SPF-PL; Cluster-based access to finance	Clustering ponds; Training through demo farmers; Arrangement of inputs on credit for some
Location	Khulna, Bagerhat, Satkhira districts	Dumuria upazila (Khulna)	Kaliganj upazila (Satkhira)
Number of clusters	300 (~25 farmers each)	5 (20 farmers each)	4 (25 farmers each)
Species	*Bagda/golda*	*Bagda*	*Bagda*

Key research questions

1. **Are these clusters inclusive? Who is excluded and why?**
2. **Do these clusters achieve their intended goal of improving farm management practices?**
3. **Do these clusters increase net profits from ponds for cluster members?**
   - What are the tradeoffs or adjustments, if any, of cluster farming?
   - Are there any spillover effects, so that those in the same village but not in the clusters also benefit?
   - Given nature of clusters, which components of the intervention drive impacts? (in progress)

Research design

- **Empirical strategy:** Canonical difference-in-differences (DID)
- Mixed methods approach – complement DID estimates with qualitative insights
- Track changes in outcomes of interest among cluster farmers

  (1) Non-cluster farmers in the same village as cluster

  (2) Non-cluster farmers in nearby/adjacent village to cluster

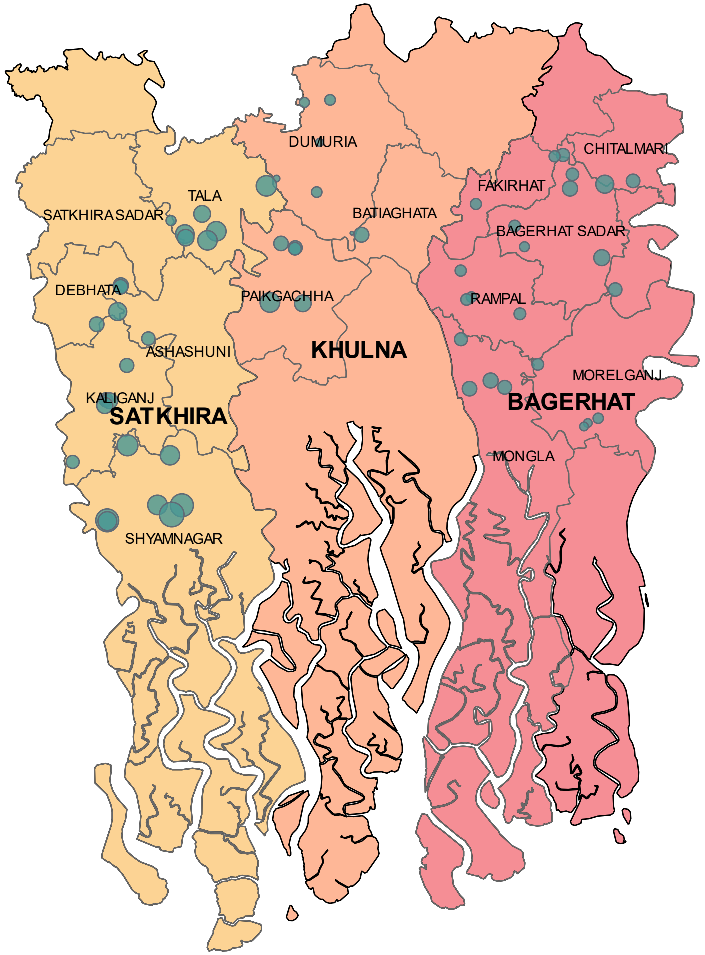
  Most clusters became fully "operational" in 2023. Some "graduated".
- **Baseline:** 2022 production cycle (collected November 2023); collected 2022 recall data on key outcomes to check common trends.
- **Endline:** 2023 production cycle (collected May 2024)

Household sample distribution

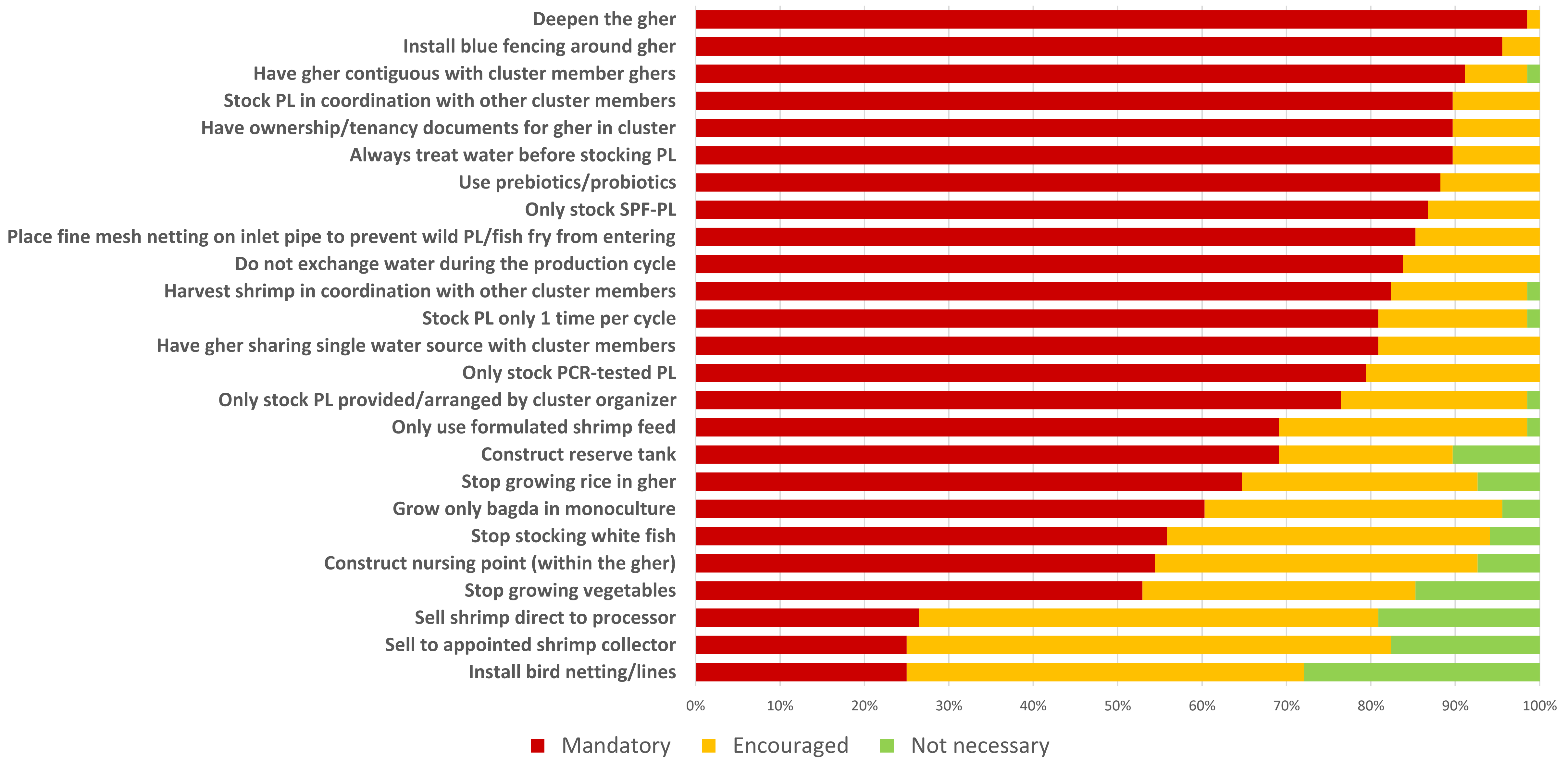
Two-stage sampling

Cluster organizer	Household sample type	Number of sampled households			
		Bagerhat	Khulna	Satkhira	Total
DoF	Cluster	166	96	182	**444**
	Non-cluster (same village)	69	36	75	**180**
	Non-cluster (adjacent village)	92	48	100	**240**
BSFF	Cluster	-	80	-	**80**
	Non-cluster (same village)	-	32	-	**32**
	Non-cluster (adjacent village)	-	48	-	**48**
ACI	Cluster	-	-	98	**98**
	Non-cluster (same village)	-	-	42	**42**
	Non-cluster (adjacent village)	-	-	58	**58**
Total	**Cluster**	**166**	**176**	**280**	**622**
	Non-cluster (same village)	**69**	**68**	**117**	**254**
	Non-cluster (adjacent village)	**92**	**96**	**158**	**346**
	Total	**327**	**340**	**555**	**1,222**

Sampled clusters



What it means to belong to a cluster



Cluster characteristics (n=64)

- 25 members, 2266 decimals, i.e. less than 1 acre/member
- Most registered (91%), have a bank account (90%), elect a representative to coordinate activities but only 19% have an office space.
- Meet regularly (8.6 times in 2023, 89% meet at least once a month)

Description	Data
Female	5.6 (4.7)
Mostly of the same religion	87%
Mostly have the same ethnic background/clan/shared kinship	79%
Mostly have the same educational background or level	4.4%
Mostly own the land they farm shrimp on	63.2%
Frequently work or interact with other groups in the same village/neighborhood	14.7%
Frequently work or interact with other groups outside the village/neighborhood	4.4%

(1) Is cluster participation selective?

Use baseline data to understand whether participation in clusters in systematically associated with individual and household characteristics via a probit model:

$$P(C_i = 1) = \alpha + \emptyset X_i + \gamma Z_i + e_i$$

$C_i = 1$ if cluster member

$X_i =$ vector of individual and household characteristics

$Z_i =$ vector of village characteristics

Household size, dependency ratio, casual labor, education (self and household head), sex, age (self and household head), years of experience in shrimp farming, religion, landholding size, asset quintiles

Village infrastructure, vulnerability to climate shocks, number of ghers, households, location (polder)

(2) What are the causal impacts of cluster farming?

$$Outcome_{it} = \beta_0 + \beta_1 \, Year + \beta_2 Cluster + \beta_3 Cluster \times Year + \emptyset \boldsymbol{X}_{it} + \boldsymbol{\gamma} \boldsymbol{Z}_i + \delta \boldsymbol{Z}_{it} + \epsilon_v$$

$Outcome_{it}$ = outcome of farmer i, time t

$Cluster$ = **binary indicator** for whether farmer i belongs to a cluster

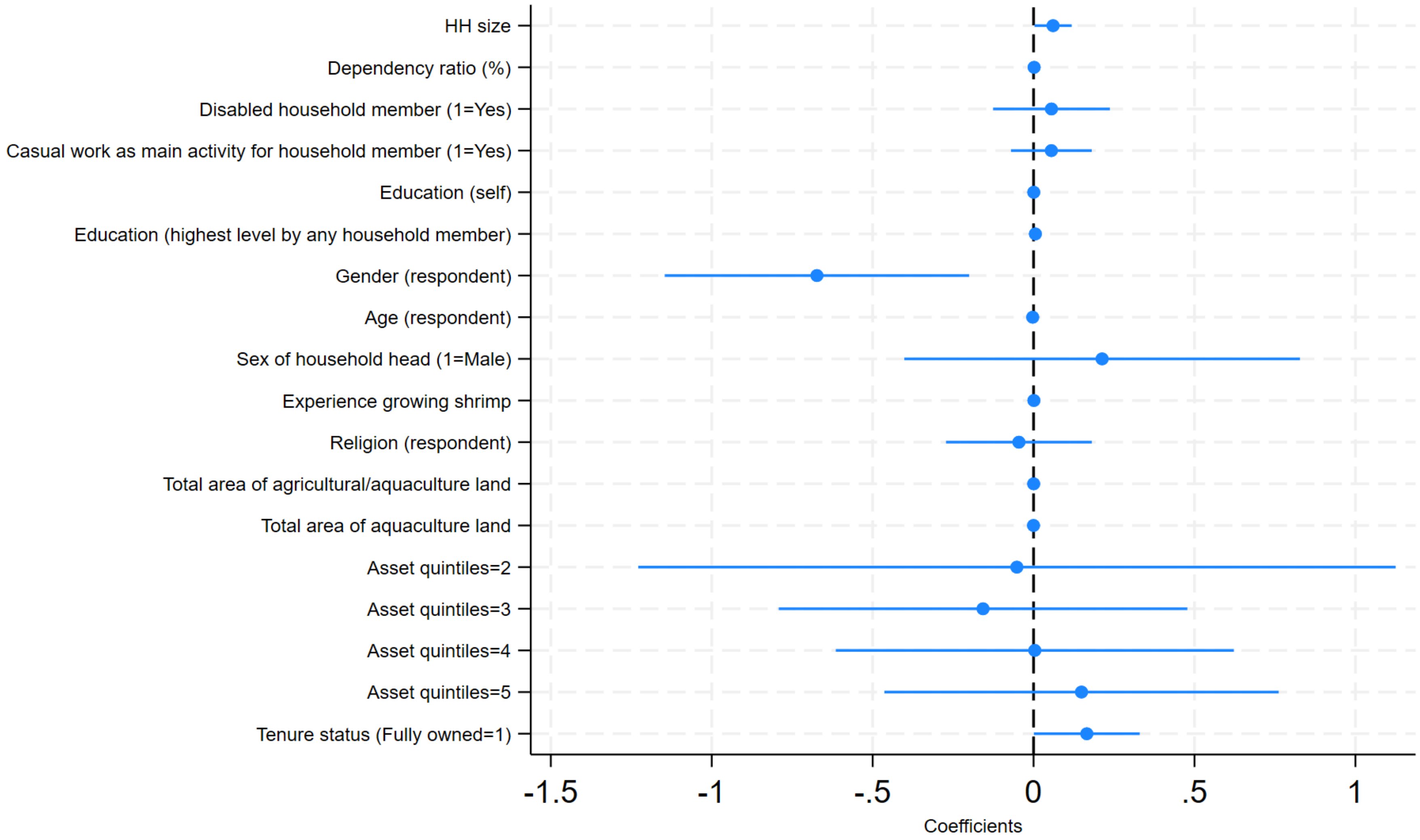
$Year$ = pre-intervention and post-intervention

$\boldsymbol{X}_{it}$ = vector of time varying pond characteristics

$\boldsymbol{Z}_i$ and $\boldsymbol{Z}_{it}$ = vector of time (in)varying community characteristics

- Standard errors clustered at the cluster level
- β_3 = primary coefficient of interest, captures causal effects, reflecting intention-to-treat (ITT) effect
- Estimated for the spillover sample: compare non-cluster farmers in cluster villages with non-cluster farmers in villages that did not receive the program.

Cluster selection is mostly not exclusionary, but larger villages with better infrastructure and suitable location were more likely to have a cluster



There are significant gains in the uptake of pond management “best” practices

	Cluster farmers (vs. all non-cluster famers)	**Graduated cluster farmers** (vs. all non-cluster farmers)	**Spillover effects** (vs. control farmers in other villages)
Pond management practices			
Share of specific pathogen free (SPF)-PL in total PL stocked (%)	23.56*** (3.791)	57.76*** (8.839)	0.795 (1.628)
Deepened the *gher* (yes = 1)	0.213*** (0.0417)	0.512*** (0.0891)	0.0176 (0.0299)
Constructed a reserve tank (yes = 1)	0.0789** (0.0355)	0.197*** (0.0637)	0.0495 (0.0390)
Constructed a nursing point (yes = 1)	0.0979*** (0.0255)	0.254*** (0.0626)	0.0103 (0.0237)
Installed blue fencing around the pond (yes = 1)	0.264*** (0.0389)	0.503*** (0.0748)	0.0259 (0.0327)
Installed bird netting/lines (yes = 1)	0.0310** (0.0134)	0.0581* (0.0333)	-0.00355 (0.0109)
Placed fine mesh netting on inlet pipe to prevent wild PL/fish fry from entering (yes = 1)	0.0368*** (0.0123)	0.0823** (0.0313)	0.0179 (0.0142)
Only stocked SPF-PL (yes = 1)	0.250*** (0.0508)	0.623*** (0.0861)	-0.000685 (0.0107)
Only used formulated shrimp feed (yes = 1)	0.178*** (0.0314)	0.549*** (0.0648)	-0.0132 (0.0142)
Used prebiotics/probiotics (yes = 1)	0.0789** (0.0355)	0.197*** (0.0637)	0.0495 (0.0390)

Pond management practices (cont'd.)

	Cluster farmers (vs. all non-cluster famers)	**Graduated cluster farmers** (vs. all non-cluster farmers)	**Spillover effects** (vs. control farmers in other villages)
Pond management practices			
Grew *bagda* (yes = 1)	0.0219 (0.0163)	-0.0173 (0.0433)	-0.0238 (0.0271)
Grew only *bagda* in monoculture (yes = 1)	0.120*** (0.0303)	0.467*** (0.0793)	-0.00134 (0.00756)
Grew *golda* (yes = 1)	-0.0135 (0.0288)	-0.171* (0.0961)	-0.0122 (0.0136)
Always treated water before stocking PL (yes = 1)	0.0664*** (0.0204)	0.279*** (0.0619)	0.00782 (0.0118)
Stocked white fish (yes = 1)	-0.0811*** (0.0221)	-0.315*** (0.0640)	-0.0102 (0.00815)
Stocked PL only once per cycle (yes = 1)	0.126*** (0.0305)	0.468*** (0.0763)	0.0153 (0.0105)
Only stocked PL provided/arranged by cluster organizer (yes = 1)	0.248*** (0.0478)	0.724*** (0.0674)	0 (.)
Stocked PL in coordination with other cluster members (yes = 1)	0.329*** (0.0578)	0.688*** (0.0742)	0.00296 (0.00422)
Harvested shrimp in coordination with other cluster members (yes = 1)	0.127*** (0.0301)	0.495*** (0.0777)	-0.00106 (0.00128)

Revenue from fish and veg decline but profits increase due to subsidized production costs

	Cluster farmers (vs. all non-cluster famers)	Graduated cluster farmers (vs. all non-cluster farmers)	Spillover effects (vs. control farmers in other villages)
Pathway indicators			
Total production costs (BDT per acre)	-14,954.9*** (4,389.8)	-40,167.1*** (7,444.7)	1,563.6 (5,567.7)
Revenue from shrimp sales (BDT per acre)	11,000.2 (18,833.8)	13,951.3 (31,222.2)	14,664.2 (30,638.9)
Revenue from fish sales (BDT per acre)	-3,010.3 (5,991.7)	-31,322.5*** (10,994.1)	-1,014.1 (8,767.5)
Revenue from fruit and vegetable sales (BDT per acre)	-2,486.9 (7,817.8)	-12,144.5** (5,590.1)	10,156.1 (10,968.1)
Total revenue (BDT pre acre)	5,904.6 (22,594.4)	-29,097.5 (38,138.4)	24,610.9 (32,652.0)
Ultimate outcome			
Profit (paid out costs) (BDT per acre)	20,859.5 (22,767.6)	11,069.6 (37,189.3)	23,047.3 (34,082.0)

Next steps

- **Update results** with separate non-graduated clusters results
- **Binary variable for cluster participation** Statistical learning techniques to isolate the components that best predict/ contribute to improvements.
- **Cluster characteristics and performance**
- **Differences across models**
- **Sustainability :** ACI Pvt Ltd. Hatchery shut down; DoF project ended

Conclusions

INITIATIVE ON Rethinking Food Markets

- 59 % of cluster respondents felt it was moderately or very successful, rest not successful in securing the cooperation and coordination among members
- 57% felt it was somewhat or extremely difficult for cluster members to follow prescribed practices

- Low supply of shrimp to processors may be a bigger problem for processors than for farmers, given that farmers have alternatives (fish, veg)
- Processors have responsibility to adopt practices that improve the reputation and quality of Bangladesh shrimp (e.g., not bulking out by soaking or glazing)
- Processors can invest in sourcing direct from farms to ensure traceability, and market the “traditional” or “natural” characteristics Bangladesh’s shrimp to help access higher value market niches

CGIAR

Rethinking Food Markets
and Value Chains for
Inclusion and Sustainability

Improving vertical and horizontal coordination in fragmented value chains

Federico Ceballos-Sierra and Fernanda Soto on behalf of the Honduras team

Washington D.C, December 10th, 2024

Rethinking Food Markets and Value Chains: Coffee in Honduras

Private intermediation markets

- Activating intermediaries in private sector-dominated value chains for inclusive and lasting impact.
- RCT w/ four treatment arms combining information flows from Point of Purchase and Technical Assistance

Typologies of women in coffee

- Building more equitable supply chains through the commitment of agribusinesses with a special focus on gender equity.
- Gender Equity Toolkit (see link)

Digital Public Infrastructure

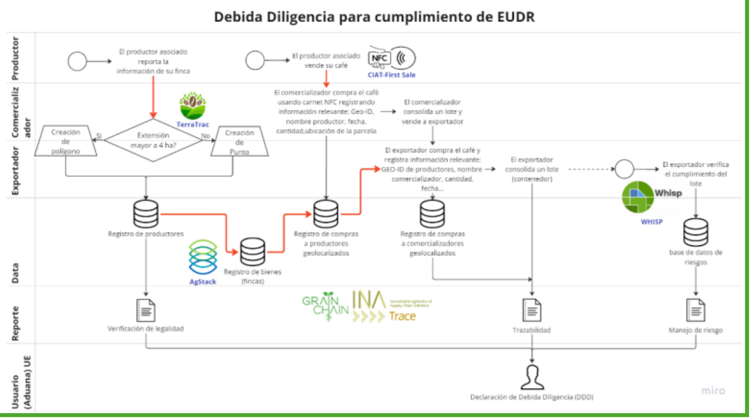
- Developing a practice for building trust between actors of disorganized value chains towards the creation of an initial public good/service: a shared data layer.
- Trust framework

Key outcomes

Private intermediation markets: trust relationship built with two intermediaries and one exporter, leading to a better understanding of their rationalities. Increased understanding of the value of capturing and sharing information. Journal article forthcoming. Picked up by USAID, now funding our partners for trebling their TA.

Typologies of women in coffee: Age, socioeconomic status, and women's subjective experiences shape how they navigate gender norms, influencing their roles, limitations, and benefits within the chain—an approach that can also be applied to understand other marginalized groups. Journal article forthcoming. Soon to be replicated with a different exporter, interest in replicating in other VCs.

Digital Public Infrastructure: Prototyping the first public-interest digital infrastructure to facilitate product traceability and information exchange among actors. Expanding geographically and thematically. Geographically: soon to be replicated in Kenya (DIASCA) and maybe Guatemala. Thematically, looking at more value added to the infrastructure (loans, climate risks, etc.).



Publications:

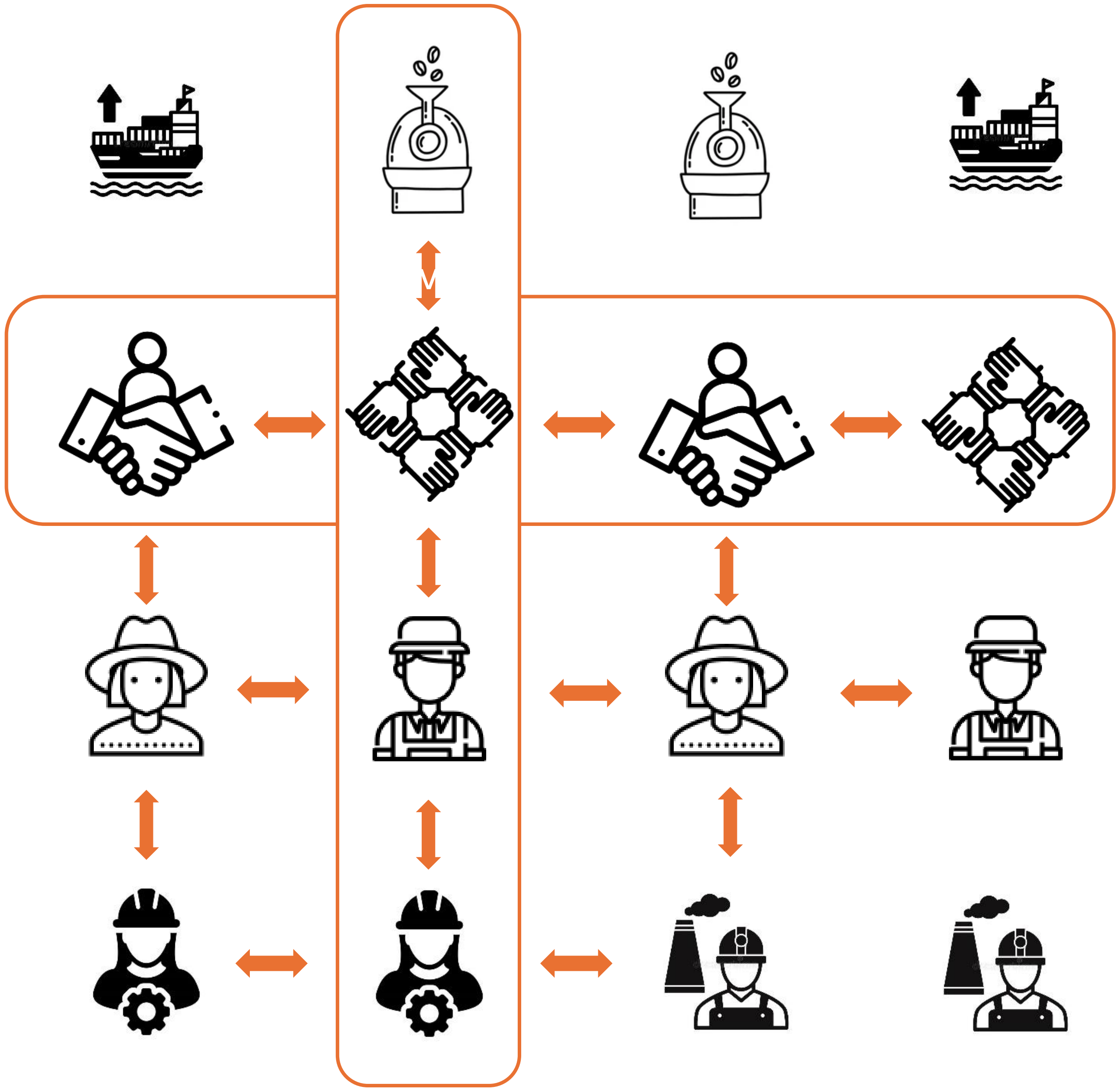
https://hdl.handle.net/10568/136910
https://hdl.handle.net/10568/151981

Improving coordination and inclusion

Vertical coordination: improved data flows originating at point of purchase.

Inclusion: Methodology for identifying typologies of women, with an eye out for causes of marginalization.

Horizontal coordination: Digital Public Infrastructures for EUDR compliance and financial service provision.



Evidence of impact: Private intermediation markets

Methods

RCT with two treatment levels and 4 treatment arms:

- ***T1:*** Control,
- ***T2:*** Technical assistance (individual and group trainings),
- ***T3:*** Point-of-purchase quality assessments
- ***T4:*** Technical assistance and point-of-purchase quality assessments

Stratified randomization by trader

N=1084 – Balanced at baseline

Main outcomes of interest: quantity sold, % of production sold to associated intermediaries, perception of improvement on market outcomes.

Secondary outcomes of interest: increased awareness of agricultural practices, adoption of agricultural practices.

Results

Comparison of means:

$$y_{i,t=1} = \alpha + \beta T_i + \gamma y_{i,t=0} + \varepsilon_{i,t=1}$$

Regression Model Summaries

	Dependent variable:		
	(log of) Amount coffee sold (kg)	(log of) Amount coffee produced (kg)	Share sold to associated intermediaries
	(1)	(2)	(3)
Technical assistance	0.059	0.092	0.043^{**}
	p = 0.736	p = 0.276	p = 0.040
Point of purchase information	0.397^{**}	0.296^{***}	-0.029
	p = 0.033	p = 0.002	p = 0.194
Technical assistance + point of purchase information	0.537^{***}	0.196^{**}	-0.017
	p = 0.003	p = 0.024	p = 0.430
Constant	4.173^{***}	1.191^{***}	0.666^{***}
	p = 0.000	p = 0.000	p = 0.000
Observations	1,084	1,084	1,069
R^2	0.104	0.548	0.721
Adjusted R^2	0.099	0.545	0.719

$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Recipients were unclear why they were receiving certain messages and this apparently annoyed people and thus rejected them. As one participant mentioned: "*Why is this being sent to me?*" The general view was that the messages "*weren't worth the effort* (Focus Group 2)."

Outcomes and impact

Farmers: Strengthened relationships with technical experts and intermediaries, facilitating knowledge transfer and capacity building. **Intermediaries:** Increased integration into the value chain by adopting improved practices and technologies, enhancing their role and profitability. **Exporters:** Strengthened long-term relationships with producers and intermediaries, fostering a more resilient and sustainable supply chain.

Evidence of impact: Typologies of women in coffee

Methods

Application of qualitative methodology using an intersectional approach to create typologies of women and men in supply chains, identifying the benefits and challenges they face.

Intersectional: understanding gender as shaped by and in relation to other social categories.

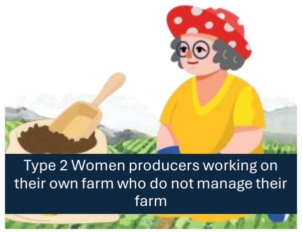
With the aim of bringing to light the experiences and needs of **underrecognized or marginalized** groups.

Results

Co-development and application with partners in Honduras (coffee) and India (tea) of a methodology to gain a deeper understanding of the diversity of women involved in agrifood supply chains.

Partners (export companies and international organizations) will use the methodology to guide tailored investments in gender equality and women's empowerment in a particular supply chain.


Type 1 Women employed in the company nursery


Type 2 Women producers working on their own farm who do not manage their farm


Type 3 Women producers working on their own farm who manage their farm


Type 4 Women producers working on their family farm


Type 5 Women harvesters employed by smallholder farmers

Outcomes and impact

Agribusinesses and other stakeholders target gender and social inclusion investments in supply chains.

Evidence of impact: Digital Public Infrastructure

Methods

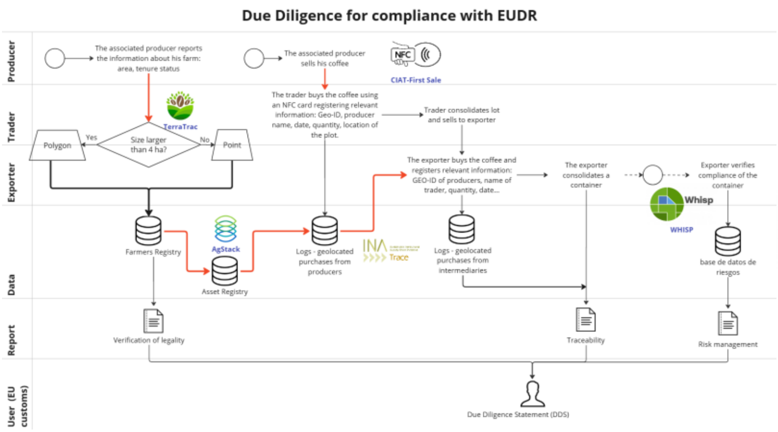
Trust framework (stakeholders involved):

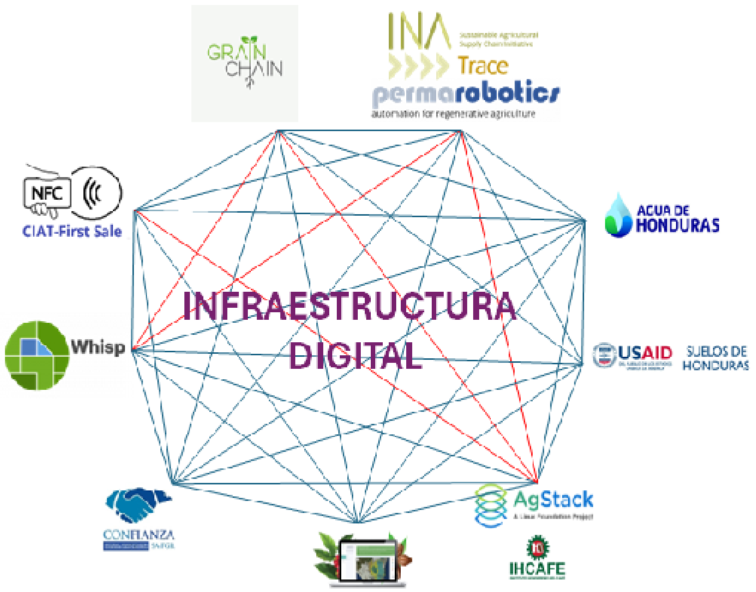
- Stakeholder mapping (180),
- Consultation (19),
- Group mediation to identify shared concerns and interests (22),
- Prototyping group for agile development (8).

Outputs:

1. Joint statement on the need for mulit-stakeholder Digital Public Infrastructure,
2. Data flows and building blocks around a shared data layer,
3. Open access, auditable, modular, “by us for us” digital twin for compliance with EUDR.

Results





Outcomes and impact

Digital twin being tested with 1200 farmers, with the goal of exporting at least one container during the 2024/20245 harvest whose traceability is supported by this infrastructure.

Seeking integration with IHCAFE and Confianza SA-FGR data infrastructures to test whether this infrastructure can strengthen IHCAFE’s farmers’ monitoring system and if it can inform loan provision.

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Parallel Session 2

Innovations for product quality upgrading and food quality standard certification - I

Presentations:

- **Marrit van den Berg**, *Wageningen University*
- **Tanguy Bernard**, *University of Bordeaux (Online) and* **Gashaw Abate**, *IFPR*

Moderator: ***Rob Vos, IFPRI***

Discussants:

- ***Matin Qaim***, *Director ZEF, Bonn, Germany (Online)*
- ***Hoa Piyaka***, *East West Seeds*
- ***Kristin Komives***, *ISEAL*
- ***Jill McCluskey,*** *Washington State University (Online)*

INITIATIVE ON
Rethinking
Food Markets

RFM Science, Innovation and Policy Symposium
10 December, IFPRI HQ – Washington DC, USA

Introducing improved seed varieties in Nigeria's vegetable value chain

Marrit van den Berg and Stellamaris Aju

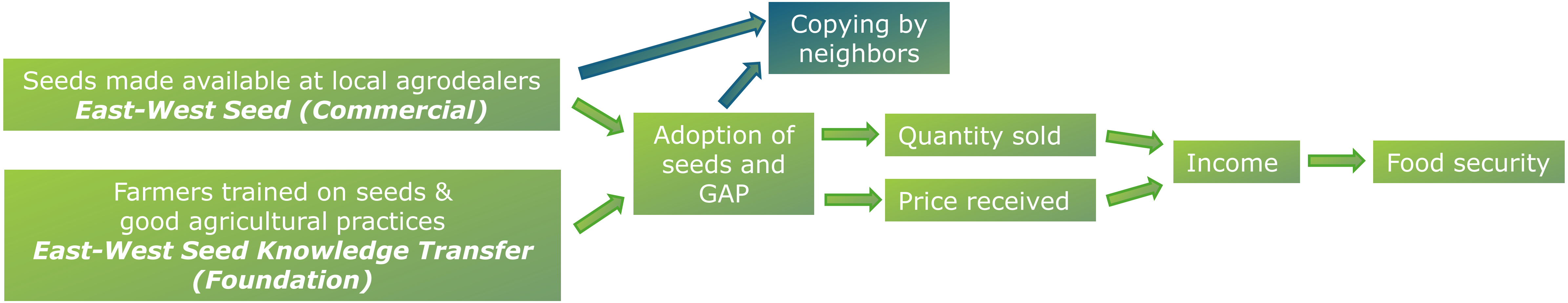
Background

Tomatenverkoper Salihu Dudu op de markt in Lagos.
Foto Femke van Zeijl

- Provision of inputs
- Production
- Distribution
- Retail
- Consumption

Research questions

- Can vegetable production be increased by making *improved seeds* available and known?
- Does this improve the livelihoods of the trained farmers?
- Do the innovations spread among neighboring farmers?
- Does public acknowledgment of trained farmers stimulate diffusion?



Intervention

East-West Seed KT Extention Module

- Extension agent trains 20-30 farmers on demo plot
  - Key farmer (provides demo plot)
  - Peer ("core") farmers
  - 5 trainings over 2 cropping cycles
  - (Voluntary practice test with public graduation ceremony)

Location

- 70 communities in Kaduna state
- 80 communities in Kanu state

Research design (RCT)

Training only

52 communities

Baseline interviews
(Aug-Nov 2023)
Key: 51
Core: 482
Other: 495

Endline interviews
(Oct-Dec 2024)

Training
Nov 2023-Apr 2024 (dry season)
May-Oct 2024 (rainy season)

Training and signaling

50 communities

Baseline interviews
(Aug-Nov 2023)
Key: 50
Core: 458
Other: 459

Endline interviews
(Oct-Dec 2024)

No training

48 communities

Baseline interviews
(Aug-Nov 2023)
Key: 47
Core: 0
Other: 595

Endline interviews
(Oct-Dec 2024)

Preliminary results

- Balancing tests reveal that treatment and control groups were highly similar at baseline
- Endline finalized in 101 communities, 49 pending
- 14% attrition rate

- 94% of farmers invited for training participated in at least 1 training
- 45% these farmers received training on at least 10 out of 26 topics

Very preliminary results

% farmers applying	Farmers in communities without training (N=368)	Farmers invited for training (N=1,124)	Neighbors without Signaling (N=244)	Neighbors with Signaling (N=269)
	1. Farmers in communities without training	2. Farmers invited for training	3. Neighbors without Signaling	4. Neighbors with Signaling
% of farmers growing vegetables	32	43	82?	37
% applying GAP (of those growing veg)				
Improved vegetable seeds	35	34	34	26
Crop rotation	83	82	82	82
Thinning	62	69	62	63
Transplanting	95	94	93	92

Next steps

- Finalizing data collection
- Cleaning data
- Impact assessment
- Reporting

Questions and Comments

LUNCH

12.00 — 1.30

Plenary Session B: Keynote

Matin Qaim, Director ZEF Bonn, Germany

CGIAR | Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Parallel Session 3

Digital innovations for tracing products & making market information accessible – II

Presentations:

- **Susan Ajambo**, *Alliance Bioversity & CIAT – Uganda (Online)*
- **Eva-Marie Meemken**, *ETH Zurich (Online)*

Moderator: Christine Chege, *Alliance Bioversity & CIAT*

Discussants:

- **Jawoo Koo**, IFPRI
- **William Buyungo Luyinda**, Cofounder & CEO, EzyAgric (Online)

INITIATIVE ON
Rethinking
Food Markets

CGIAR

Science, Innovation and Policy Symposium
10 – 11 December 2024, IFPRI HQ, Washington D.C.

Raising awareness of about the EzyAgric Digital Platform

Presenters: Susan Ajambo, Kikulwe Enoch, Sylvester Ogutu, Eliud Birachi, Stewart Ategeka & Zilla Mary Arach
WP 3

Background

Digital innovations have the potential to address bottlenecks in Agricultural Value chains, including:

- Access to extension services,
- marketing systems,
- suitable financial products,

For the benefits to be realized, the innovations must be adopted at scale.

However, the reach of digital innovations is limited by challenges, such as a lack of awareness

Partnered with **EzyAgric,** to implement awareness creation measures for farmers.

Intervention process

1. Scoping study involving various value chain finance and logistics digital innovations
2. Selection of most promising innovation (EzyAgric)
3. Partnering with EzyAgric
4. Innovation designing
5. Baseline
6. Intervention
7. Follow-up study

Timeline

Scoping

- Alliance of Bioversity and CIAT
- Value chain finance and logistics Ag-tech companies

Nov 2022

Mar 2023

Selection of EzyAgric

- Alliance of Bioversity and CIAT

Partnering

- Alliance of Bioversity- and CIAT
- EzyAgric

Jun 2023

Sep 2023

Innovation Designing & Bundling

- Developing training materials
- Bioversity-CIAT & EzyAgric

Baseline

- Bioversity-CIAT- study design and data collection
- Site selection- Bioversity and EzyAgric

Sep 2023

Oct 2023

Intervention

- Conducting the trainings-EzyAgric
- Monitoring- Bioversity

Follow-up study

Sep 2024

Oct 2024

Scaling readiness workshop

Selection process of EzyAgric

1 → 2 → 3 → **EzyAgric**

1. Identification of digital Platforms

- 32 digital platforms - online search and snowballing
- Profiling of identified platforms

2. Scoping Study

To assess the strengths and weaknesses of the platform, and gender and youth responsiveness

3. Development of Selection Criteria

A nine-point criterion validated in a multi-stakeholder meeting

EzyAgric

- **High Potential for Impact**: Ability to significantly address inefficiencies in VCs.
- **Bundled Services** offers a variety of integrated services

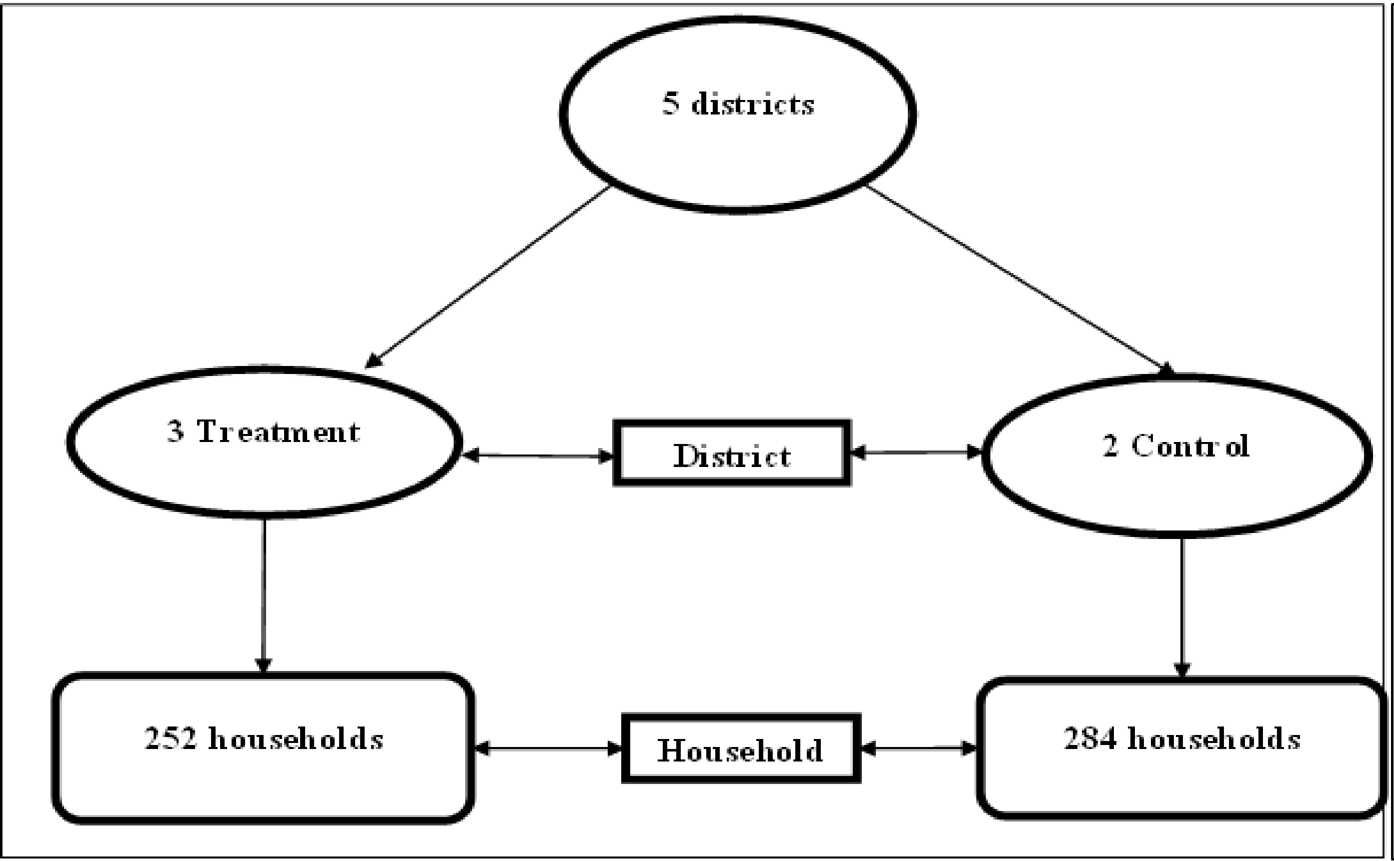
EzyAgric Attributes

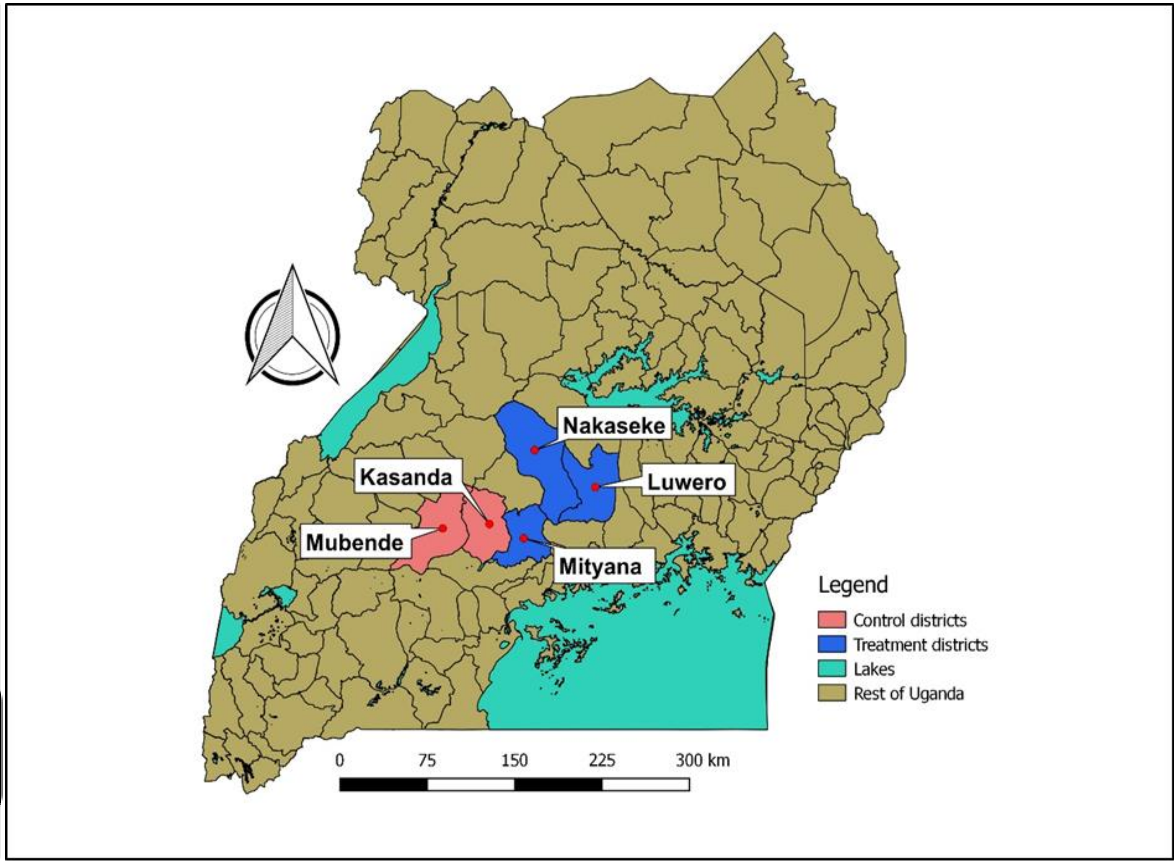
- A web platform, at a massive scale, guiding and connecting farmers and agribusinesses to services
  - **400,000 registered farmers**

- [How to order for inputs]

Intervention Aim

- To Increase farmer's awareness of the EzyAgric digital platform and its bundled innovative services.
    1. Digital literacy training focused on e-access to genuine, traceable agro-inputs
    2. Agronomic training with a focus on the safe use and handling of agrochemicals





The Intervention Bundle

- The App
- A user guide
- Agronomy (CSA)
- Proper identification and handling of agro-chemicals

Data collection

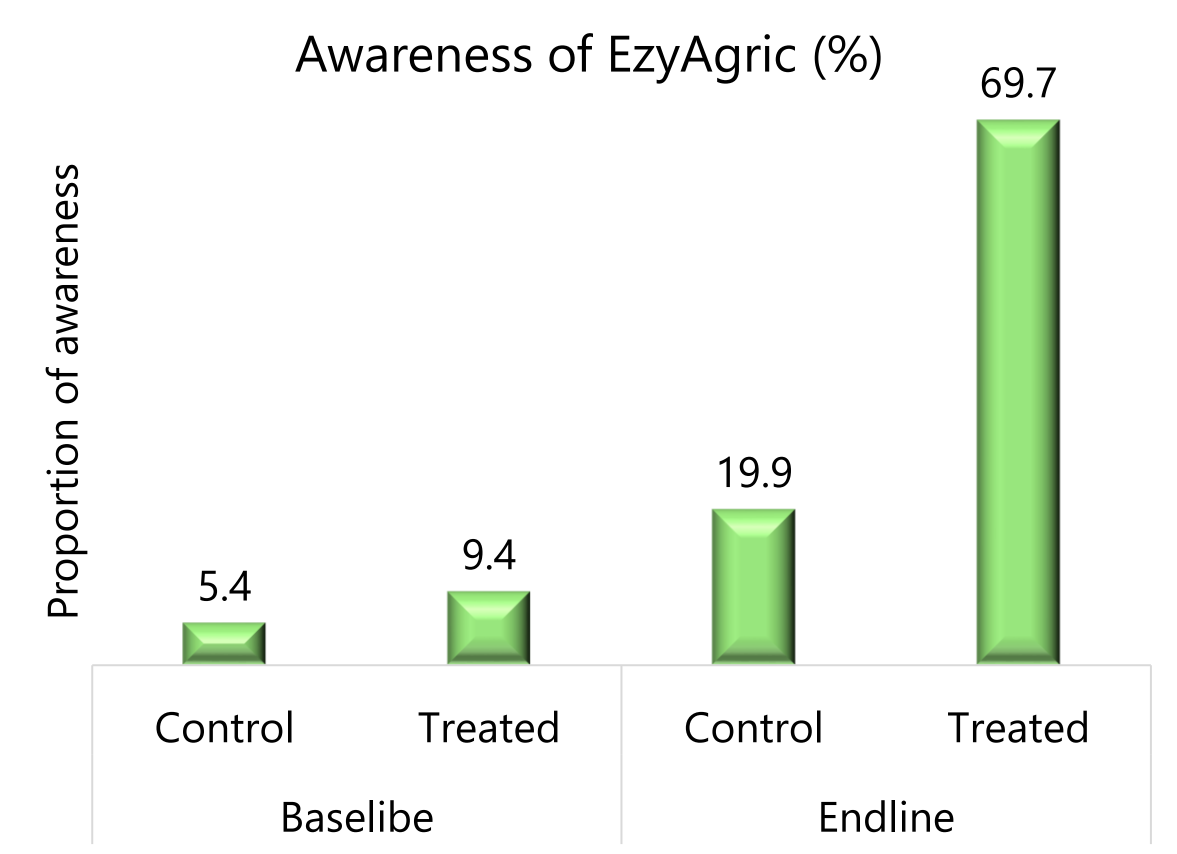
At two levels:

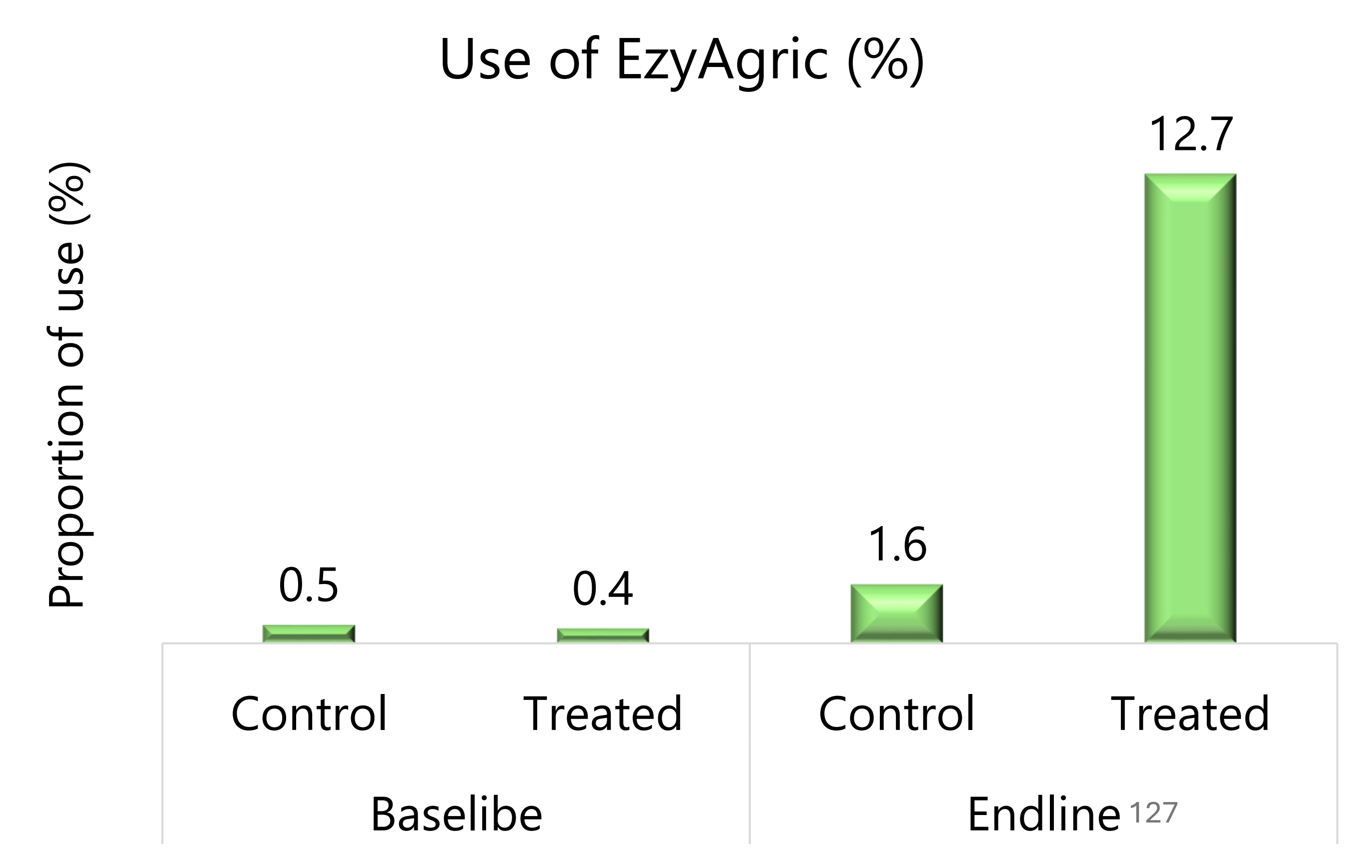
- **Population level** based on the EzyAgric database capturing the results emerging from the interventions
    - **Data captured before and within the intervention periods.**
- **Sample level**: using RCT, data was collected from a sample of farmers in both intervention and control sites.
    - **Base-line and follow-up surveys**

FINDINGS

Awareness, and use of EzyAgric platform and innovations

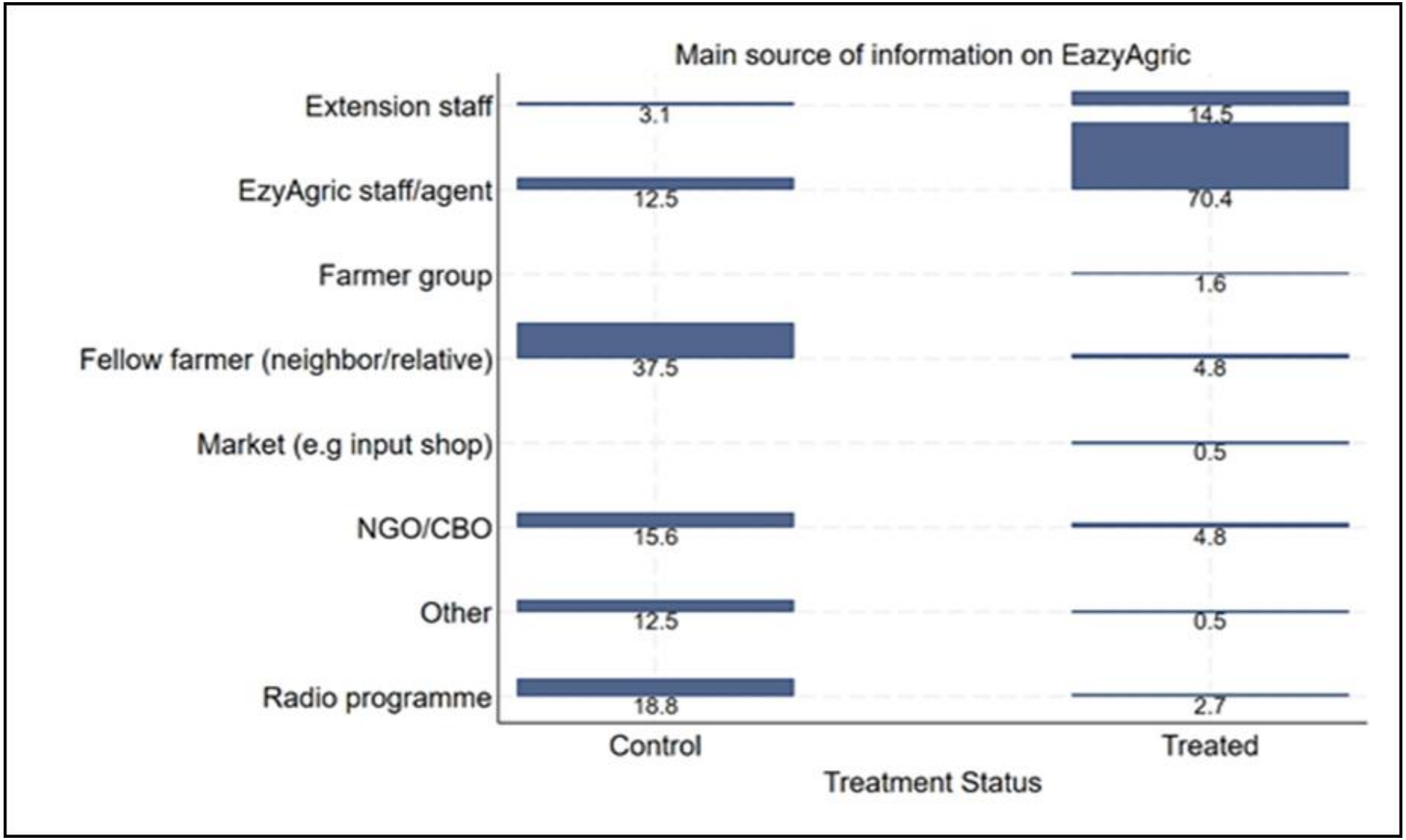
- Awareness of the EzyAgric platform increased **fivefold** in intervention districts compared to control districts.
- Significant rise in awareness did not translate into proportional usage of the platform.





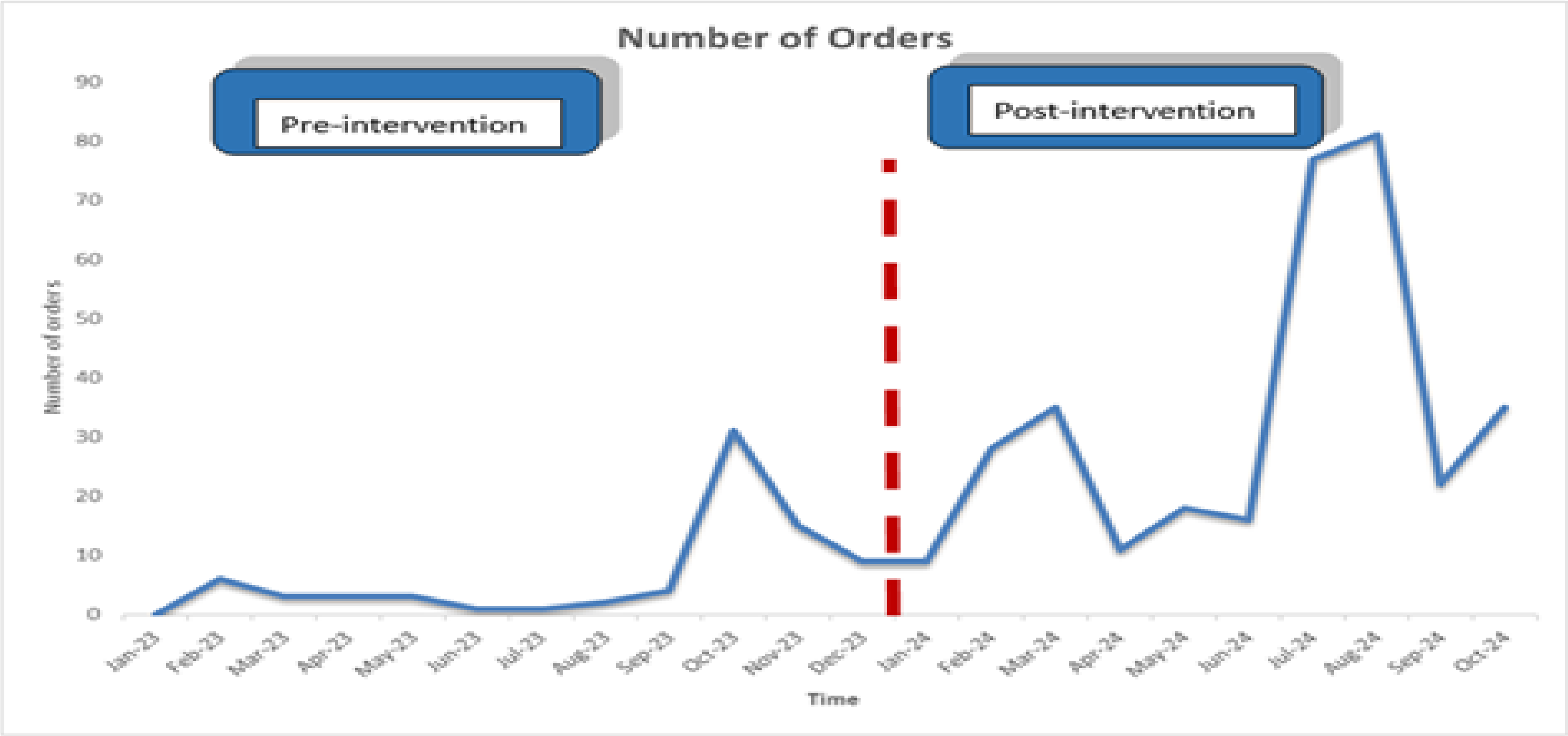
Information sources on EzyAgric platform and innovations

- EzyAgric staff are the primary sources of information.
- Farmer-to-farmer interactions are key in spreading awareness.

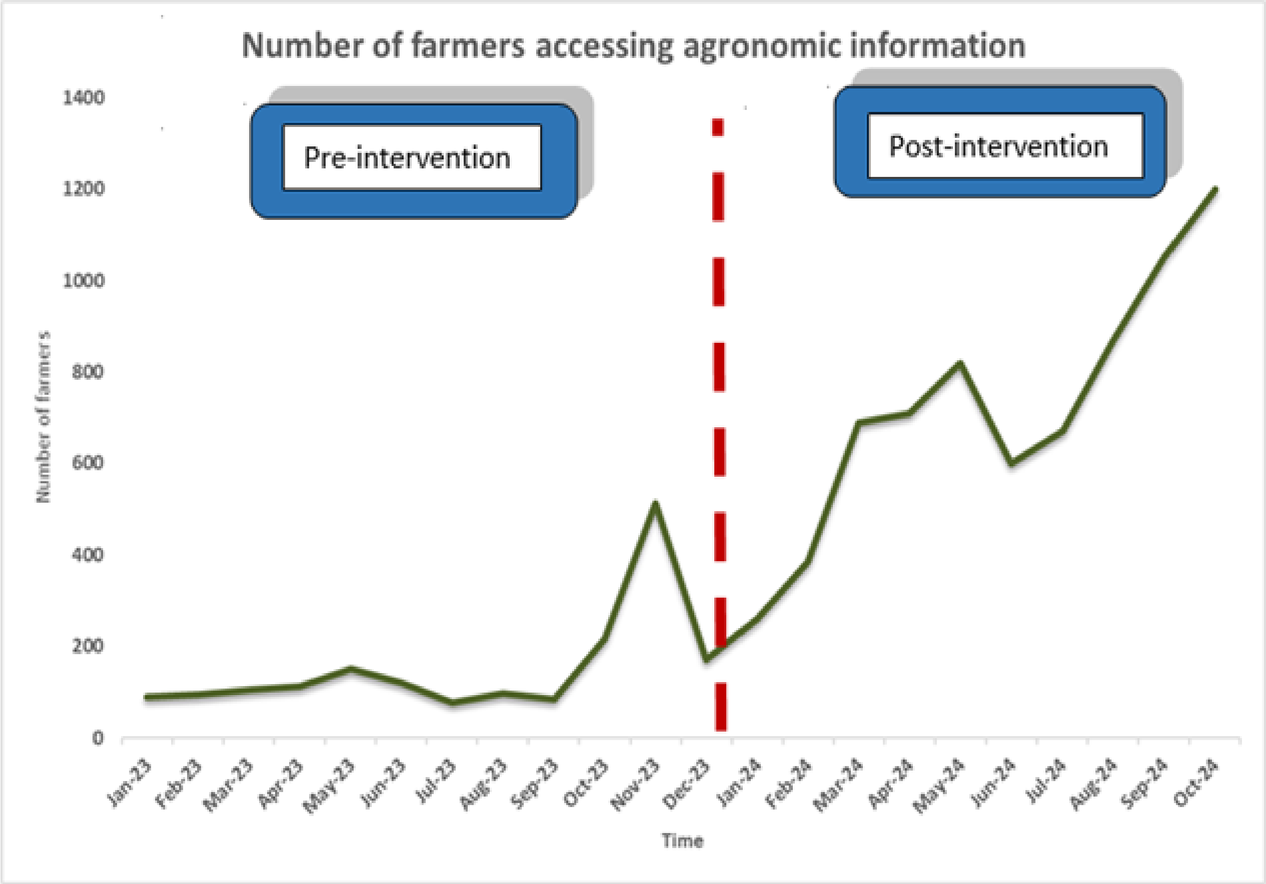


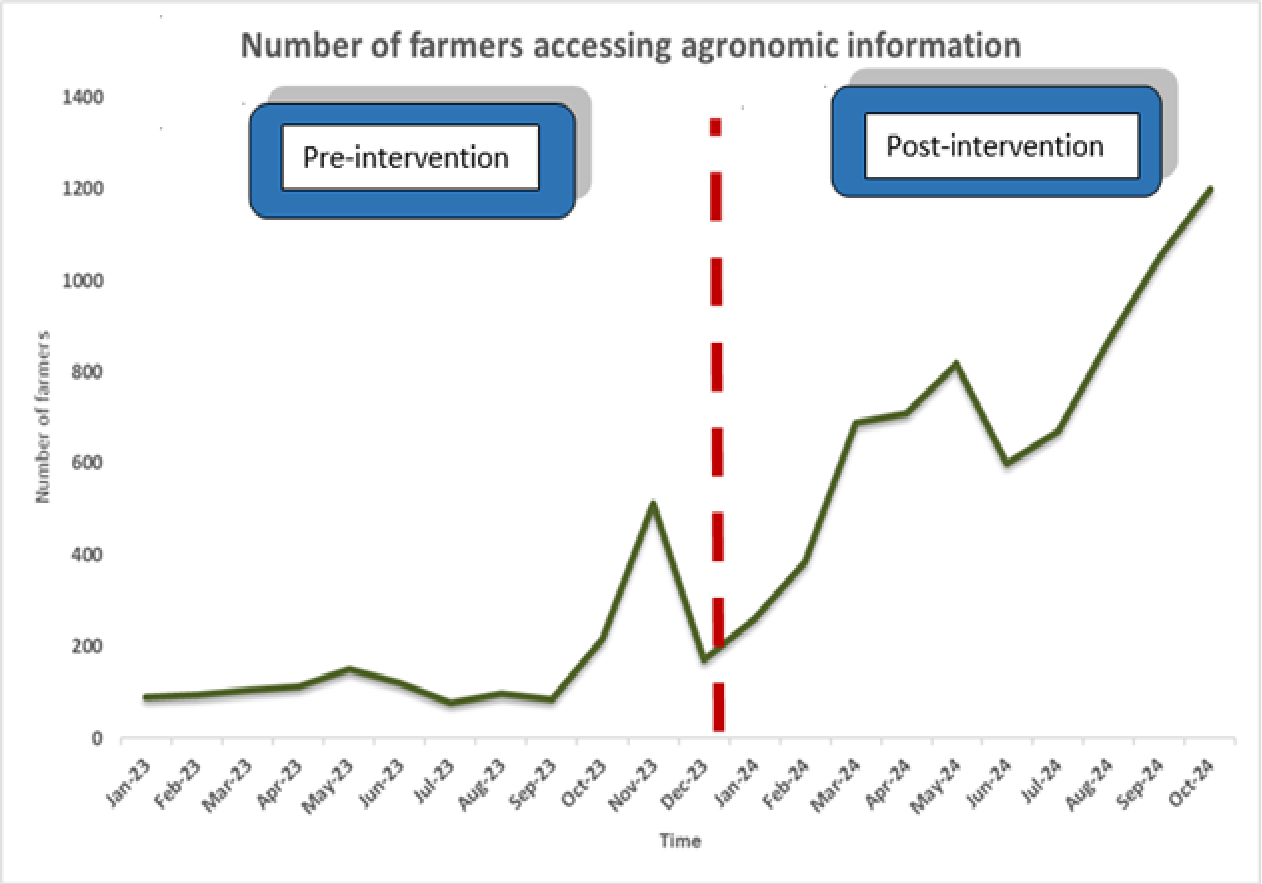
Services and information accessed via the EzyAgric platform following intervention

A notable increase in the number of Agro-input orders made on the platform.



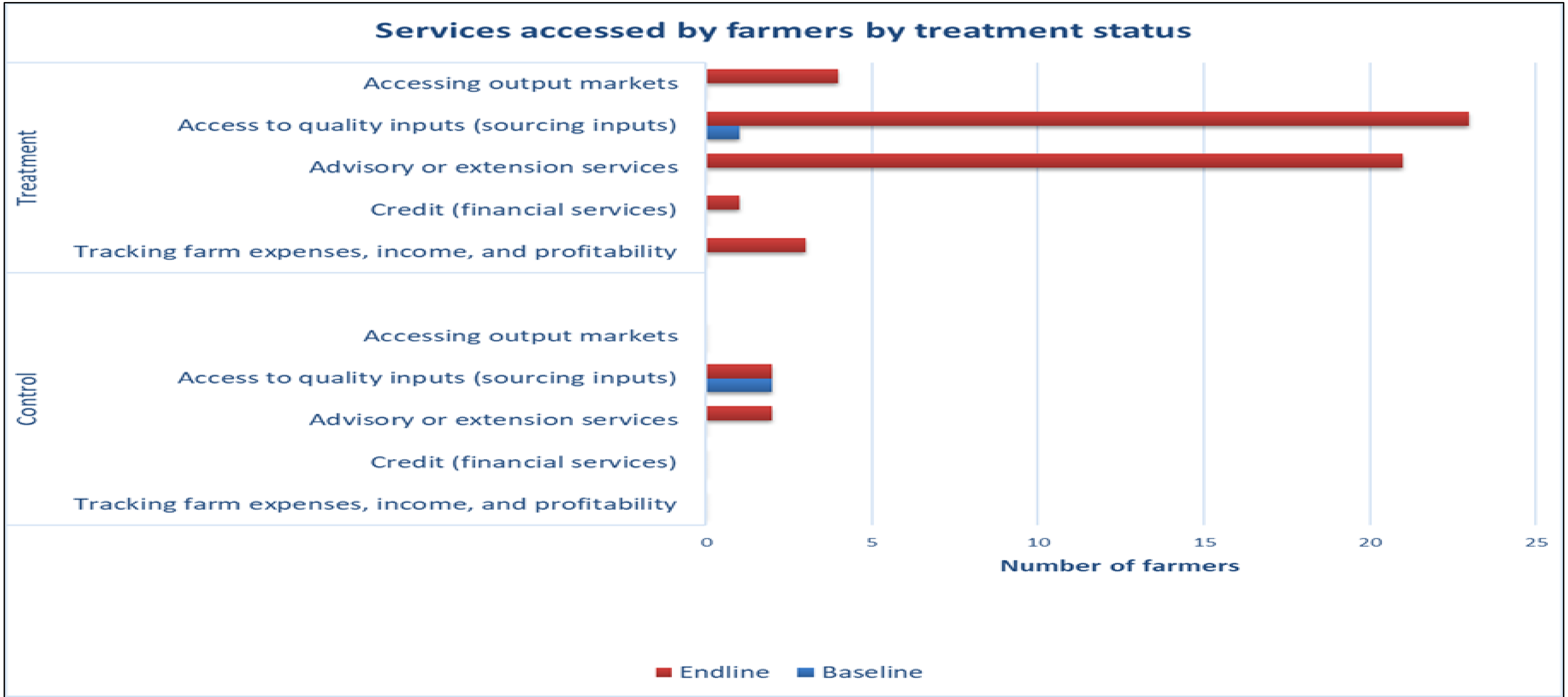
Increase in the number of farmers accessing agronomic information, and the volumes ordered on the EzyAgric platform following the intervention.





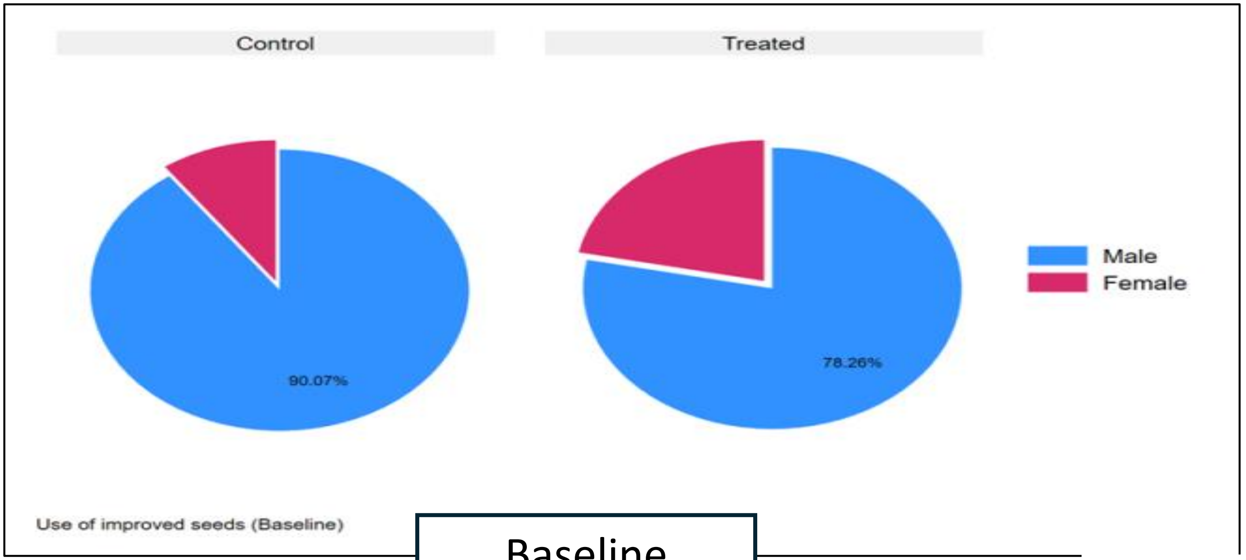
Services accessed

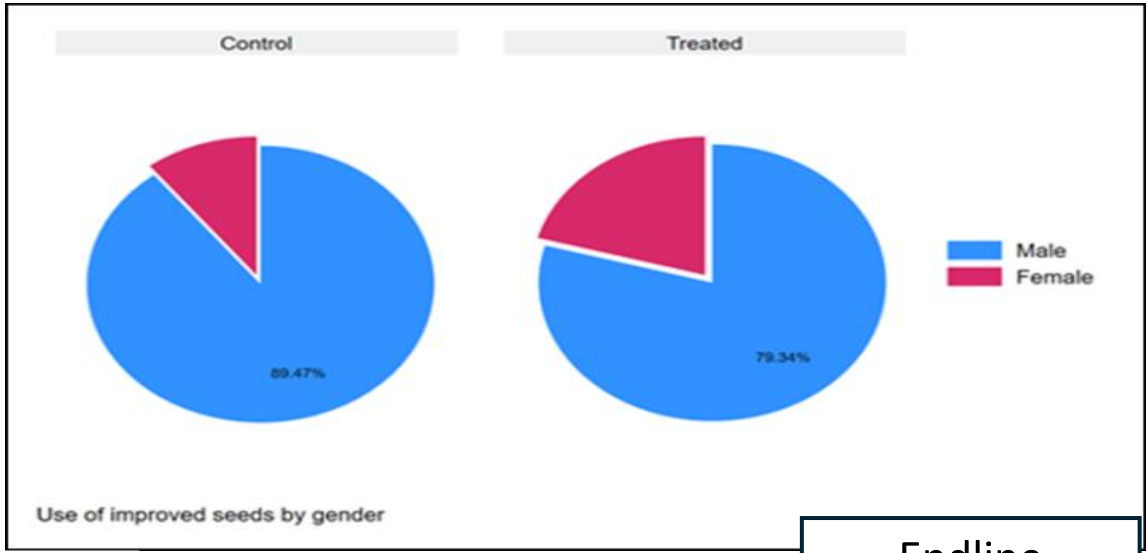
Access to agro-inputs and Extension services-the main services accessed through the platform



Men had more access to agro-inputs than women but a slight increase in usage by female-headed households observed.

Use of Improved seeds

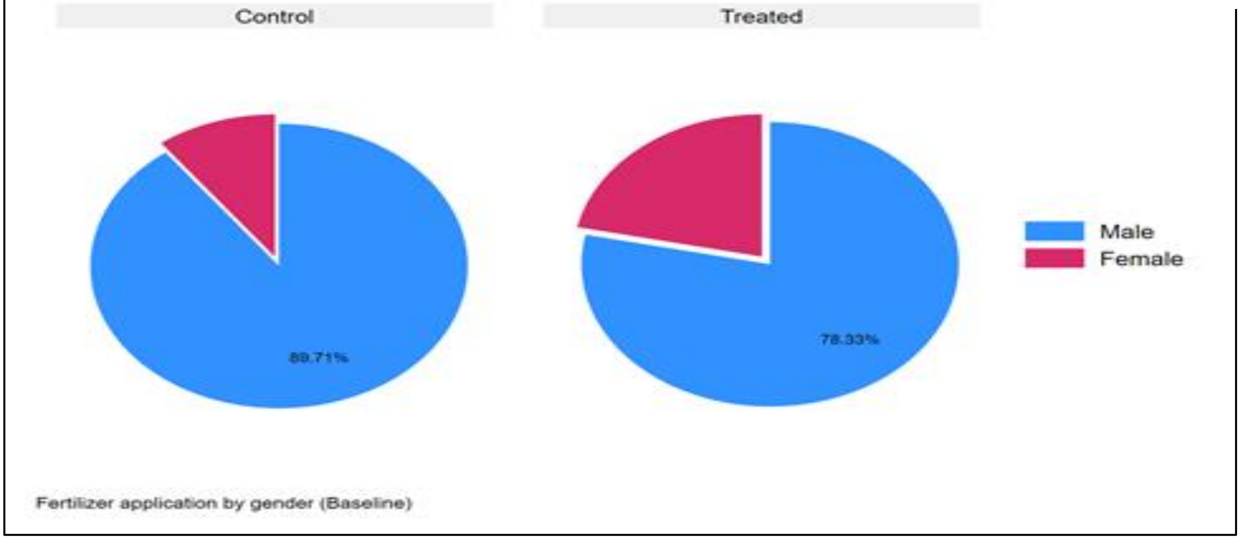


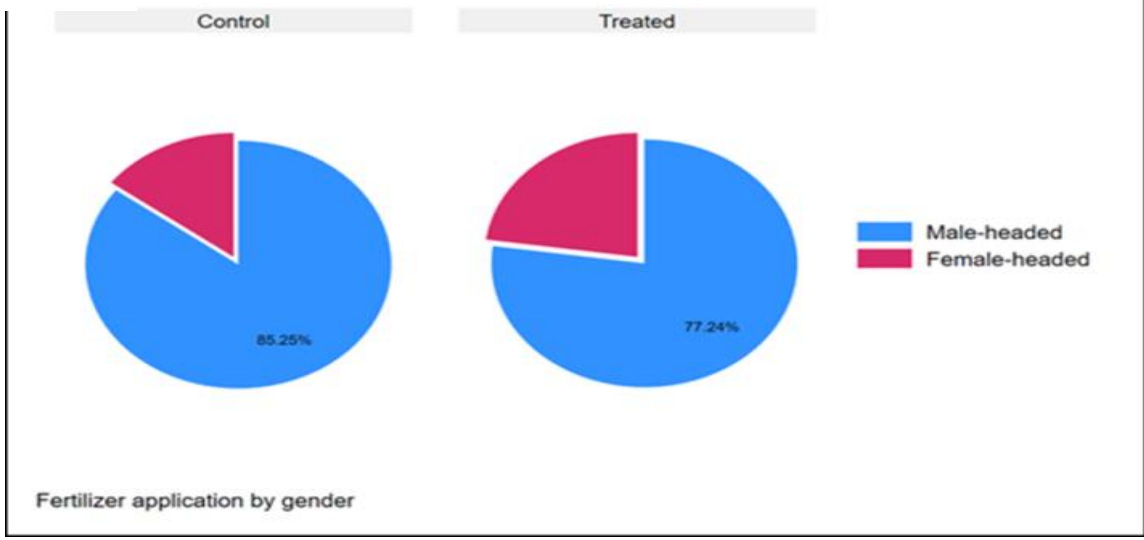


Baseline

Endline

Use of Fertilisers





The impact of the intervention on awareness of the EzyAgric platform increased

- Awareness of the platform increased by 170 percentage points post-intervention.
- Awareness among female farmers was lower compared to their male counterparts despite overall gains

Variables	(1) Awareness	(2) Awareness
Treatment effect	1.601*** (-0.128)	1.679*** (-0.135)
Female (1=Female, 0=Male)		-0.321* (-0.168)
Household size(count)		.057** (-0.026)
Group member (Yes/No)		0.118 (-0.137)
Farm size (acre)		0.001 (-0.003)
Distance to village market (km)		0.028 (-0.028)
Distance to agro-input dealer (km)		-0.008 (-0.016)
Constant	-1.086*** (-0.100)	-1.554*** (-0.226)
Observations	512	512
Pseudo R2	0.25	0.264

Note: *Standard errors are in parentheses *** p<.01, ** p<.05, * p<.1, column 1 is the result of the regression including only the treatment*

The impact of the intervention on Agricultural inputs

- Positive and statistically significant effect of the awareness creation on improved seeds.
- 41-percentage point increase in the use of improved seeds.

Variables	**Improved seeds**	**Fertilizer**	**Agrochemicals**
Treatment effect	0.411***	0.147	-0.477***
	(-0.116)	(-0.114)	(-0.110)
Constant	-0.466***	0.037	0.378***
	(-0.085)	(-0.081)	(-0.080)
Observations	490	490	536
Pseudo R2	0.019	0.002	0.026

Note: *Standard errors are in parentheses *** p<.01, ** p<.05, * p<.1, column 1 is the result of the regression including only the treatment*

The impact of the intervention on productivity indicators

However, a positive trend is observed in yields suggesting emerging productivity gains that could result from the intervention.

	(1) Maize yield (kg/acre)	(2) Beans yield (kg/acre)	(3) Banana yield (bunches/acre)	(4) Coffee yield (kg/acre)
Treatment effect	0.034	0.015	0.129	0.201
	(0.234)	(0.23)	(0.167)	(0.153)
Constant	4.537***	4.454***	3.054***	5.429***
	(0.169)	(0.166)	(0.125)	(0.111)
Observations	536	536	391	267
R-squared	0	0	0.002	0.006

*Notes: Standard errors are in parentheses; *** p<.01, ** p<.05, * p<.1*

The impact of the intervention on Welfare indicators

Positive and statistically significant effects on all four welfare outcome indicators

	(1) Food expenditure per capita	(2) Non-food expenditure per capita	(3) Gross production revenue	(4) Total value of assets
Treatment effect	0.153**	0.228**	0.219**	0.239**
	(0.063)	(0.099)	(0.097)	(0.105)
Female (1=Female, 0=Male)	-0.103	-0.236*	-0.158	-0.400***
	(0.080)	(0.127)	(0.123)	(0.135)
Household size(count)	-0.044***	-0.088***	-0.070***	0.019
	(0.013)	(0.020)	(0.019)	(0.020)
Group member (Yes/No)	-0.055	-0.029	0.016	0.188*
	(0.066)	(0.105)	(0.102)	(0.112)
Distance to village market (km)	-0.019	-0.039*	-0.041**	-0.040*
	(0.013)	(0.021)	(0.021)	(0.023)
Distance to agro-input dealer (km)	-0.005	-0.010	-0.009	-0.010
	(0.007)	(0.011)	(0.011)	(0.012)
Constant	12.747***	10.232***	8.967***	6.273***
	(0.183)	(0.657)	(0.681)	(0.534)
Observations	487	499	508	500
R-squared	0.116	0.075	0.097	0.363

*Note: Standard errors are in parentheses; *** p<.01, ** p<.05, * p<.1*

CONCLUSION AND RECOMMENDATIONS

- **Potential of Digital Innovations**:
  - Cost-effective tools to address agricultural challenges.
  - Require digital literacy and awareness campaigns to boost adoption.

- **Intervention Outcomes**:
  - Significant increase in awareness and use of the EzyAgric platform and genuine seeds.
  - Reduction in agrochemical use due to safe handling training.
  - Positive, though not statistically significant, effects on crop productivity (maize, beans, coffee, bananas).

- **Wider Impact**:
  - Significant improvement in household consumption expenditure, gross revenues, and asset value.
  - Findings highlight the potential for scaling digital innovations in Uganda.

Implementation challenges

Short intervention time- need for continuous training

Limited time after intervention for adoption before the cropping season began.

Farmers unaware of the potential losses caused using counterfeit products

Lack of immediate, visible benefits and incentives

Women encounter challenges with user interface and language barriers.

Lesson learned

Need
- Need to broaden the training content to include other services offered on the App.

Include
- Include incentives in the innovation bundle

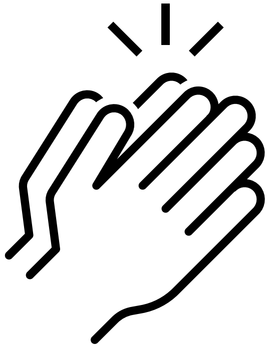
Scaling
- Scaling needs to draw more on agro-input merchants as intermediaries for farmers

Gender
- Gender and social inclusion programing

- Falling guy

End of Presentation

Thanks for listening



ETH zürich

FSEP
FOOD SYSTEMS ECONOMICS AND POLICY GROUP

Digital innovations for monitoring sustainability in food systems

Joint work with Inbal Becker-Reshef, Laurens Klerkx, Sanneke Kloppenburg, Jan Dirk Wegner, & Robert Finger.

Nature Food 2024
https://doi.org/10.1038/s43016-024-01018-6

Eva-Marie Meemken | Food Systems Economics and Policy Group

Photo: L. Sharma (Marchmont Communications)

Motivation

Digital monitoring approaches proliferating in food systems

Remote sensing with drones & satellites

Smartphones

AI

Online platforms

Big data

Blockchain

Enhance transparency, fairness, open access…

…or dystopian landscape of digital surveillance, division, led by a powerful few?

Outline

1. The proliferation of digital monitoring
2. Challenges & opportunities
3. Agenda for policy and research

nature food

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Perspective | Published: 15 August 2024

Digital innovations for monitoring sustainability in food systems

Eva-Marie Meemken, Inbal Becker-Reshef, Laurens Klerkx, Sanneke Kloppenburg, Jan Dirk Wegner & Robert Finger

Nature Food **5**, 656–660 (2024) | Cite this article

Is monitoring needed?

- **Big sustainability challenges in food systems**
- **Public & private standards & initiatives to address them** (Schleifer et al. 2022; Baylis et al. 2008; Basu 2003)
- **Common challenges:** need for effective, efficient, transparent, fair **MMR** (Ehlers et al. 2021; Meemken et al. 2021)
  - **M**easurement, using indicators
  - **M**onitoring: collection, processing, analyzing data
  - **R**eporting: feedback to regulators/consumers about compliance)
- **Providing evidence key** as non-compliance is cheaper; credence goods

Problems with "conventional" approaches

- Conventional approaches: self-reported data & surveys/in-person audits
    - Inefficiencies, high costs, bureaucracy, inaccuracies, delays, subjectivity, corruption (Ansah et al. 2020; Meemken el a.. 2021; Sellare et al. 2022)

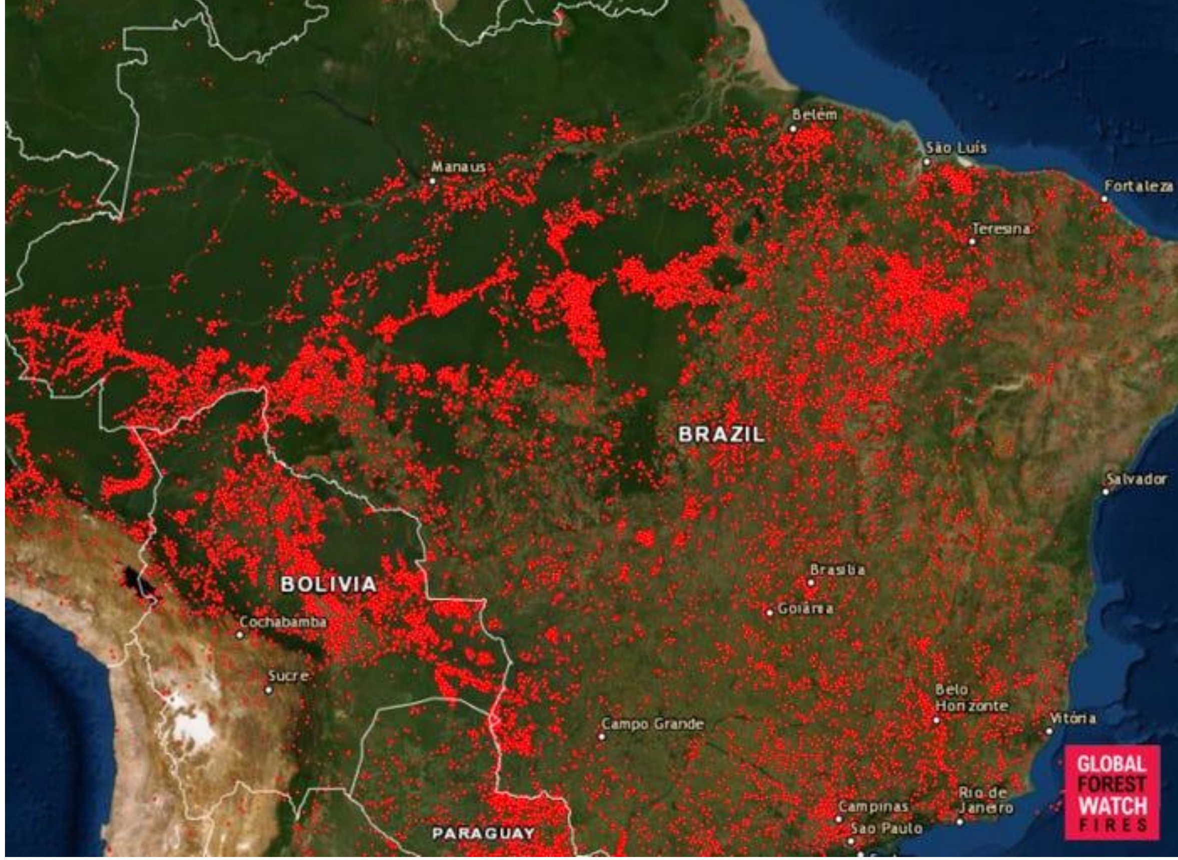
→Proliferation of digital tools
- Further facilitated by pandemic (Castka et al. 2020; Nicorescu et al. 2019)

Agenda

1. The proliferation of digital monitoring
2. Challenges & opportunities
3. Agenda for policy and research

Better digital MMR?

- **Measurement:** objective measures
  - Environment: e.g., forest fires
  - Social issues: difficult (Hatanaka et al. 2022)
- **Monitoring:** speed, frequency, scale, scope (satellite data, predictive analytics)
  - Tracking of land use, yields, management & deforestation (Curtis et al. 2018; Lobell et al. 2020)
  - Market activity, informal settlements (Blackstone et al. 2021, Progga et al. 2020; Henderson et. Al. 2012; Kougkoulos et al. 2018)



(Global Forest Watch/businessinsider.com Link)

Better digital MMR?

- **Measurement:** objective measures
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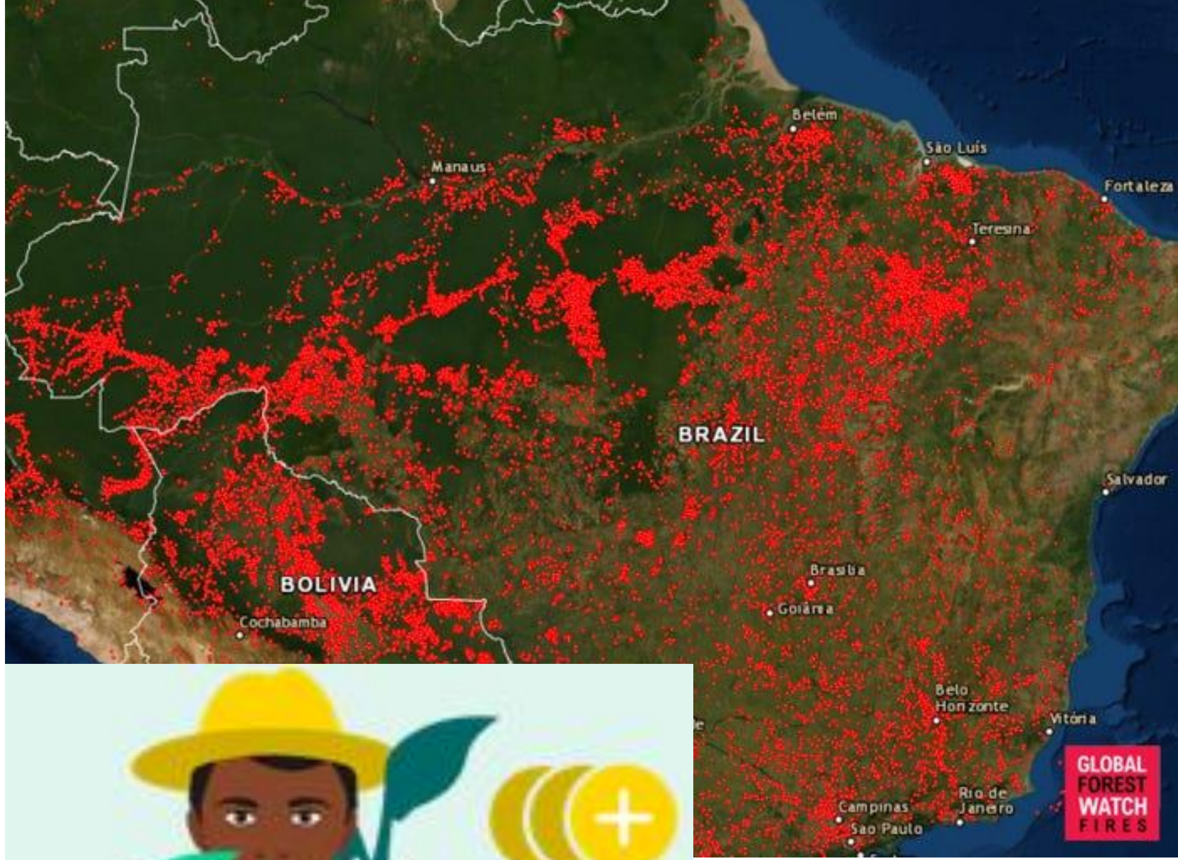
  - Market activity, informal settlements (Blackstone et al. 2021, Progga et al. 2020; Henderson et. Al. 2012; Kougkoulos et al. 2018)
- **Reporting:** e.g., blockchain
  - Many applications but limitations (Niknejad et al. 2021; Lee et al. 2022)



(Global Forest Watch/businessinsider.com Link)

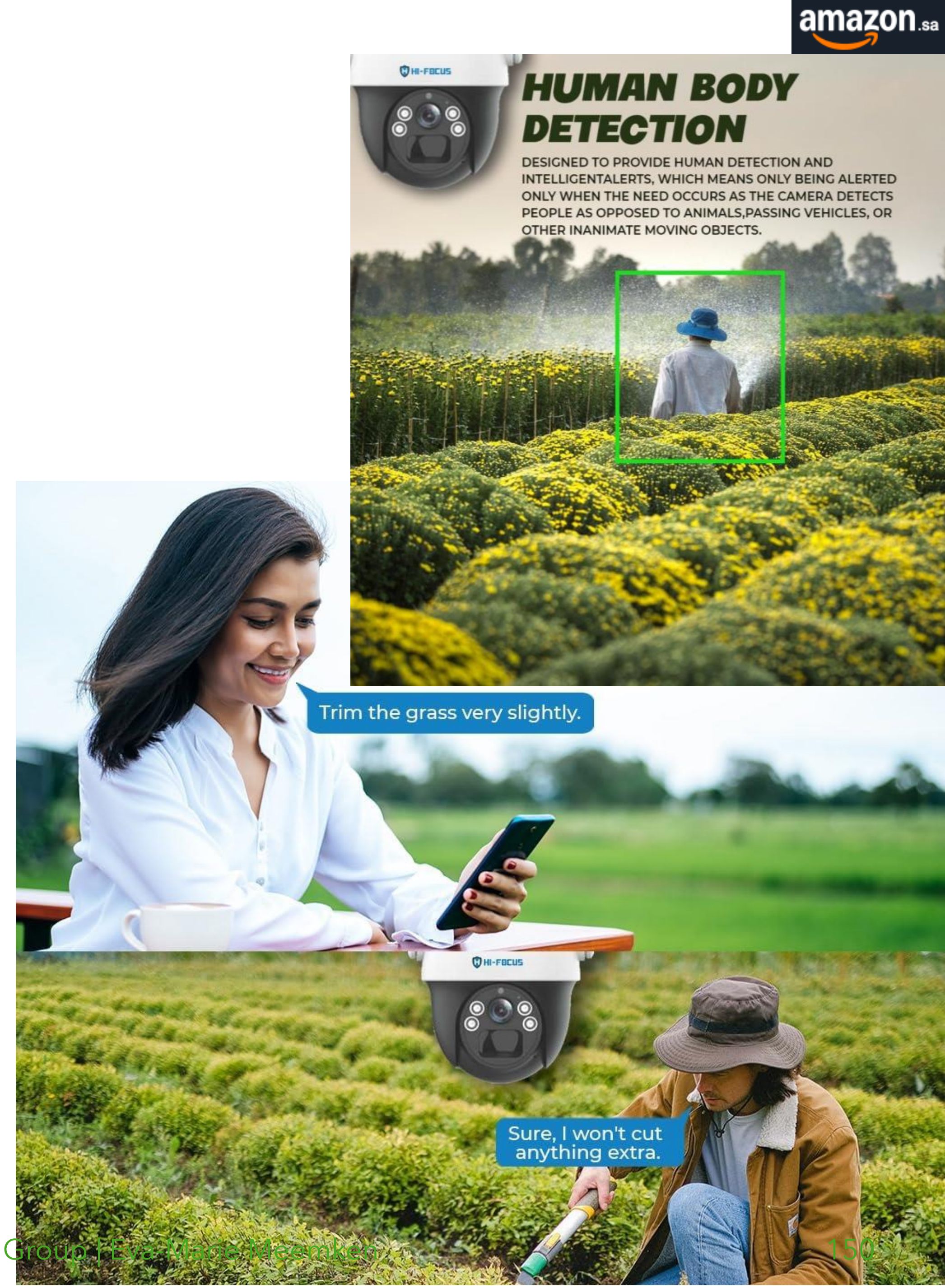
https://koa-impact.com/radical-transparency/

Implementation cost & upscaling

- **Potential cost reductions, with variation**
  - Trade-offs between remote sensing data resolution & costs
  - Ground data/truthing (esp. social indicators)
- **Initial investments & ongoing expenses** (Hatanaka et al. 2022)
  - Technology
  - Ground data for validation
  - Educational requirements capacity & expertise
  - Organizational learning & operations
- **Who can cover these costs?**

Socio-ethical concerns

- Exclusion, digital divide, leakage (Nikander et al. 2020; Sellare et al. 2022)
- Requiring/generating data
- High energy / labor use for e.g., AI (Galaz et al. 2021; Rijswijk et al. 2021)
- Data security, bias, privacy, ownership (Rijswijk et al. 2021; Archer 2021)
  - Dominant firms (MacPherson et al. 2022; Clapp & Ruder 2020)
  - Who & what is monitored & how data are collected, processed, analysed is not a neutral choice (Kloppenburg et al. 2022)



Agenda

1. The proliferation of digital monitoring
2. Challenges & opportunities
3. Agenda for policy and research

Agenda for policy & research

- **Will the digital transition lead to more sustainable food systems?**
  - More data vs. resolution of problems
  - Biased focus on what can be measured?
- **Priorities to promote fair transition:**
  - Co-design & co-development
  - Investment & financial partnerships
  - Leverage opportunities for farmers
  - Global action needed for comprehensive legal framework
  - Address the root causes of the problem

Conclusion

- **Digital MMR is here to stay!**
- Opportunities & challenges
- Addressing challenges requires:
  - Actions from different stakeholders & levels
  - Global partnerships
  - Inter/transdisciplinary research

Thank you!

Reach out: emeemken@ethz.ch

Photo: L. Sharma (Marchmont Communications)

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Parallel Session 4

Innovations for product quality upgrading and food quality standard certification - II

Moderator: Nicholas Minot, IFPRI

Presentations:

- **Byron Reyes**, *Alliance Bioversity & CIAT* - Honduras
- **Bho Mudyahoto**, *Head- Monitoring, Evaluation & Learning (Global), Harvest Plus (Online)*

Discussants:

- **Madhur Gautam**, *IFPRI*
- **Kristin Komives**, *ISEAL*
- ***Javier Enrique Quan Garcia****, Ministry of Agriculture and Livestock, Honduras (Online)*

CGIAR

INITIATIVE ON
Rethinking Food Markets

Initiative workshop-December 2024

Bundling technical messages and on-site quality testing for smallholder bean producers in Honduras

B. Reyes; A. Espada; M. Colindres; F. Ceballos-Sierra;
J. Wiegel; M. Peña
WP2

Research lines

- From scoping study, we identified several research lines, will discuss two of them:
  a) New chips formulations and new packaging in collaboration with food processing industry ➔ **"Industry pilot"**
  b) Increased farmers' access to differentiated (higher-value) markets through farmer associations ➔ **"Bean pilot"**

a) **Industry pilot:** two activities

➢ Estimating nutritional benefits and consumer acceptance of maize chips combined with alternative flours

- **Goal:** Evaluate alternative maize chips, assess consumer acceptance, and explore their potential to improve diets and foster local SME innovation
- **Methods:** preliminary sensory evaluations to identify 4 best formulations (maize + beans, chia, flaxseed, beetroot; then tested their acceptance by over 300 consumers in supermarkets in 3 cities in Honduras
- **Results:** laboratory test demonstrated new formulations had excellent nutritional and technological properties; and consumers liked all blends, with preference for the corn + chia and corn + flaxseed formulations

Research lines

a) **Industry pilot** (cont.):

- ➢ Influence of packaging on the purchasing behavior of whole cooked red beans by consumers
  - **Goal:** Evaluate packaging acceptance and consumer preferences for cooked whole red beans
  - **Methods:** Cooked red beans packaged into Stand-Up Pouch bags with nutritional information, ingredients and expiration data in its label (picture); then distributed to 137 households and inquired about sensory acceptance, the packaging, WTP for the packaged beans, etc.
  - **Results:** stand-up packaging was highly accepted by consumers who positively valued the information in the label; and they are WPT 10% more for it (which more than offsets the costs), suggesting opportunities for SMEs in this market

Research lines

b) Bean pilot

- Problem: associations commit to supply differentiated markets, provide services to farmers, but farmers side sell grain (to others), and grain quality can be improved
- Identified and evaluated two innovations:
    i. On-site grain quality testing & price information → make process more transparent for farmers
    ii. Sharing technical information via WhatsApp → reinforce knowledge about key practices
- Cluster randomized controlled trial: control [15 villages]; innovation (i) [19]; innovation (i) + (ii) [15]
- Want to evaluate the impact of the innovations on adoption and marketing decisions, to answer:
    1. Do farmers who benefit from treatment (i) adopt more practices that can lead to higher grain quality? And is adoption of such practices higher when technical knowledge is reinforced via phone messaging (treatment ii)?
    2. Are farmers who receive the treatments more likely to sell to their associations? Do they sell more beans to the associations?
    3. Do farmers who benefit from the innovations obtain higher incomes from bean sales?
- Outcome variables of interest: adoption of key practices promoted; whether they sell to the association and how much they sell; and income from bean sales

Bean pilot intervention timeline

Q1 2023

Partner identification

Q2 2023

Discussions with partners

Innovation identification

Study design

Q3 2023

Contracting partners

Baseline

2023

Postrera season: sending technical messaging via WhatsApp

23-24

End of Postrera season: on site grain quality testing

Q2 2024

Midline survey

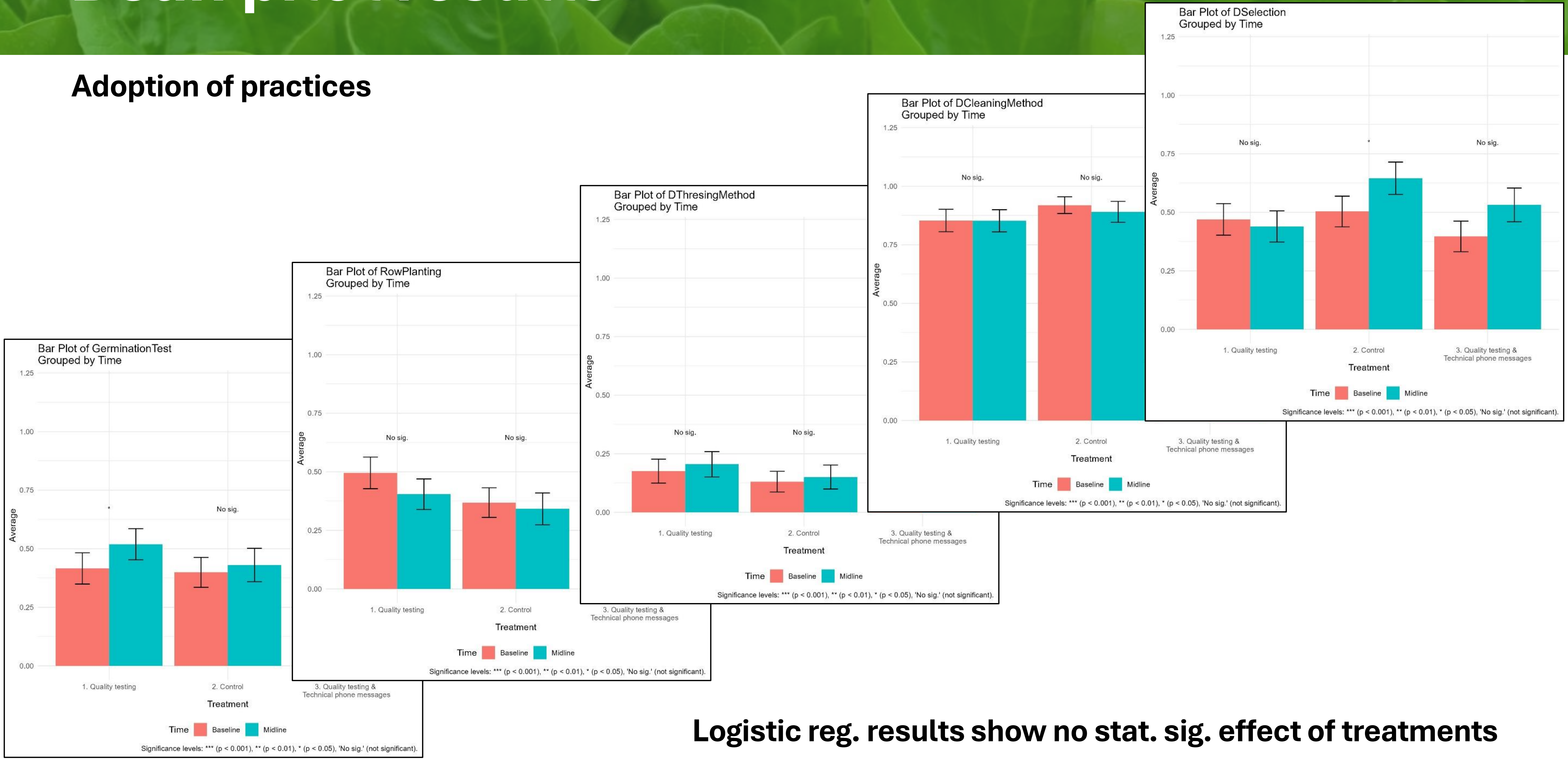
Q3-Q4 2024

Continued intervention (Primera & Postrera seasons)

Endline survey (ends Q1 2025)

Bean pilot results

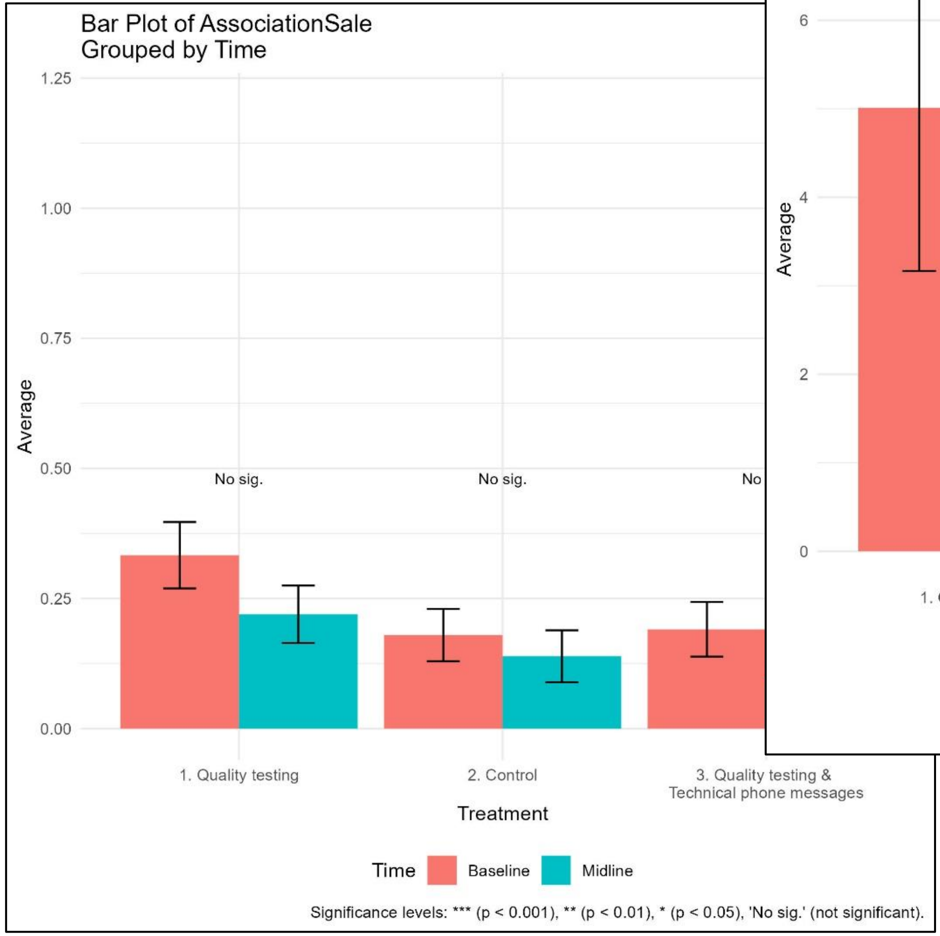
Adoption of practices

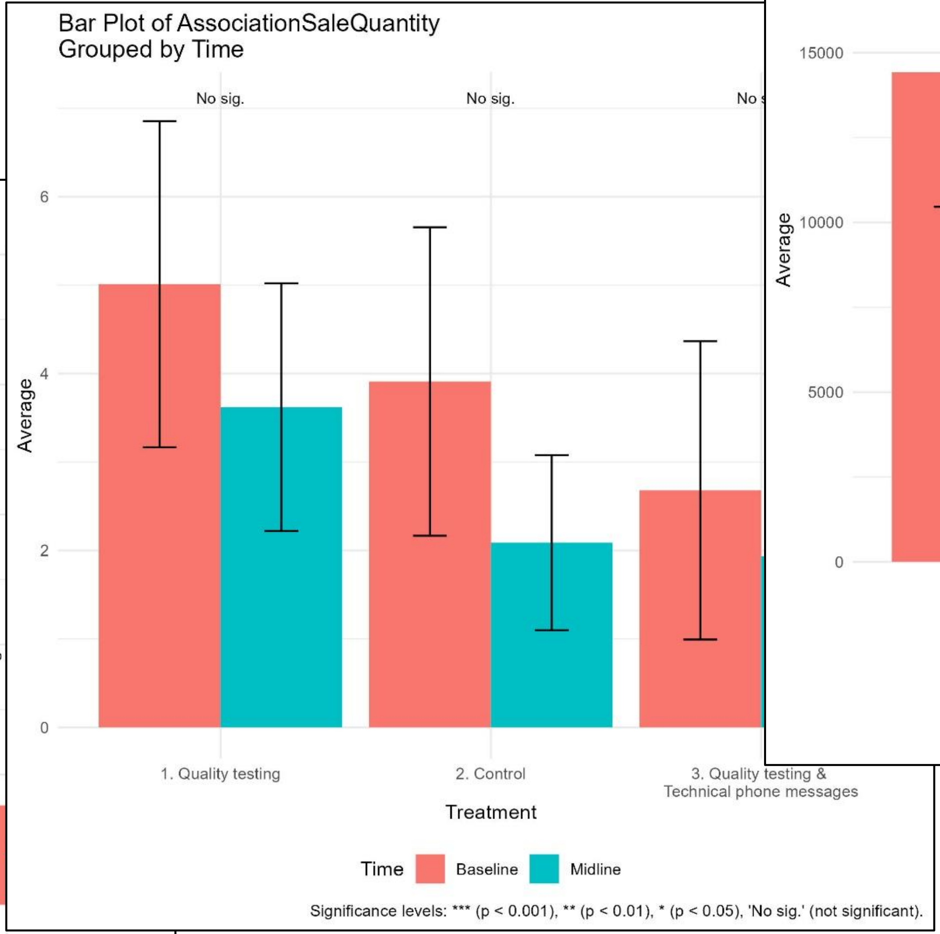


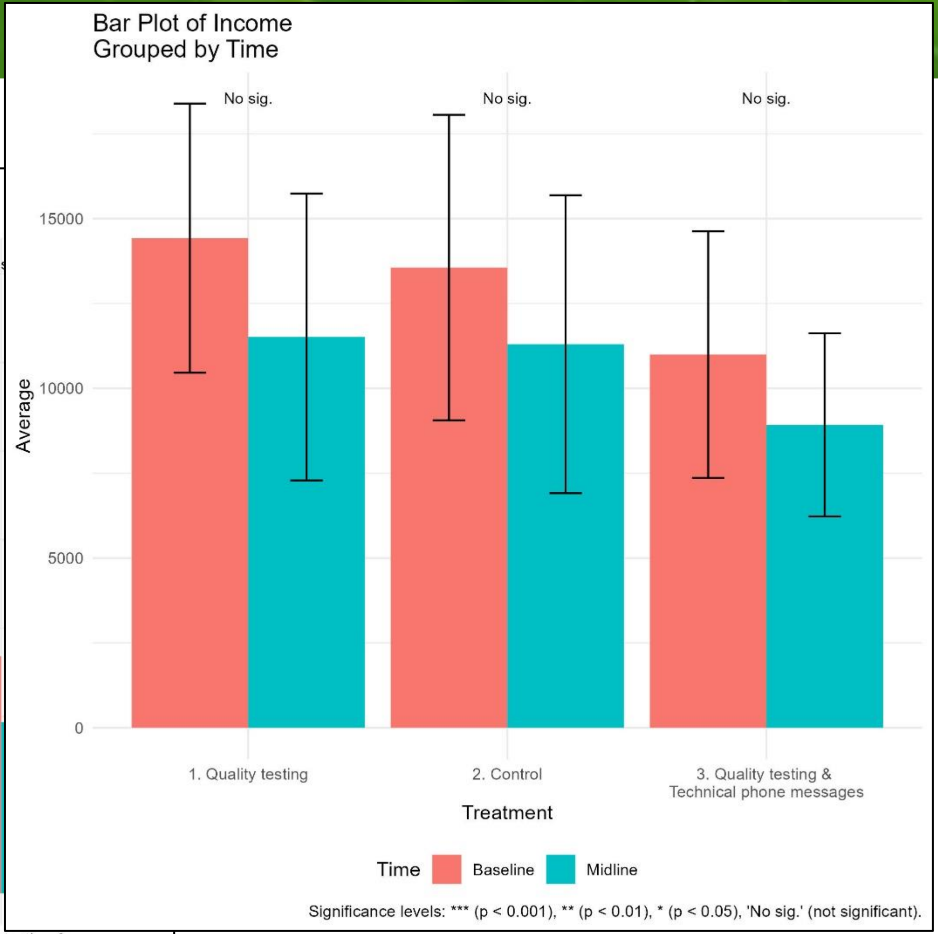
Logistic reg. results show no stat. sig. effect of treatments

Bean pilot results

Marketing decisions and income

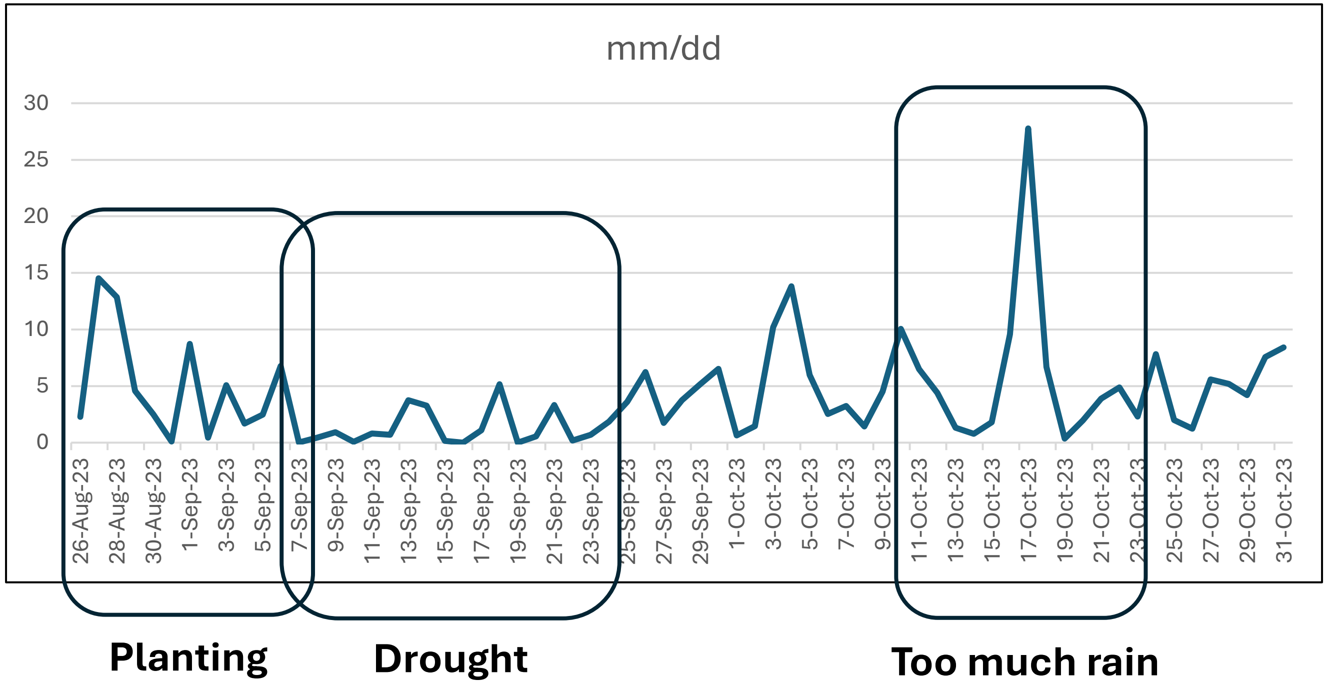


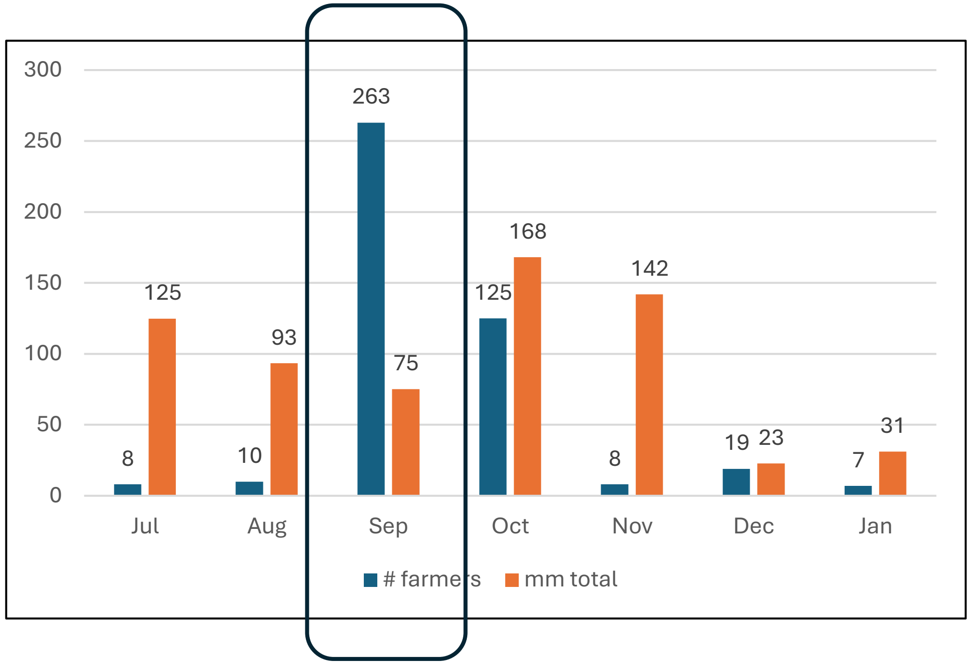




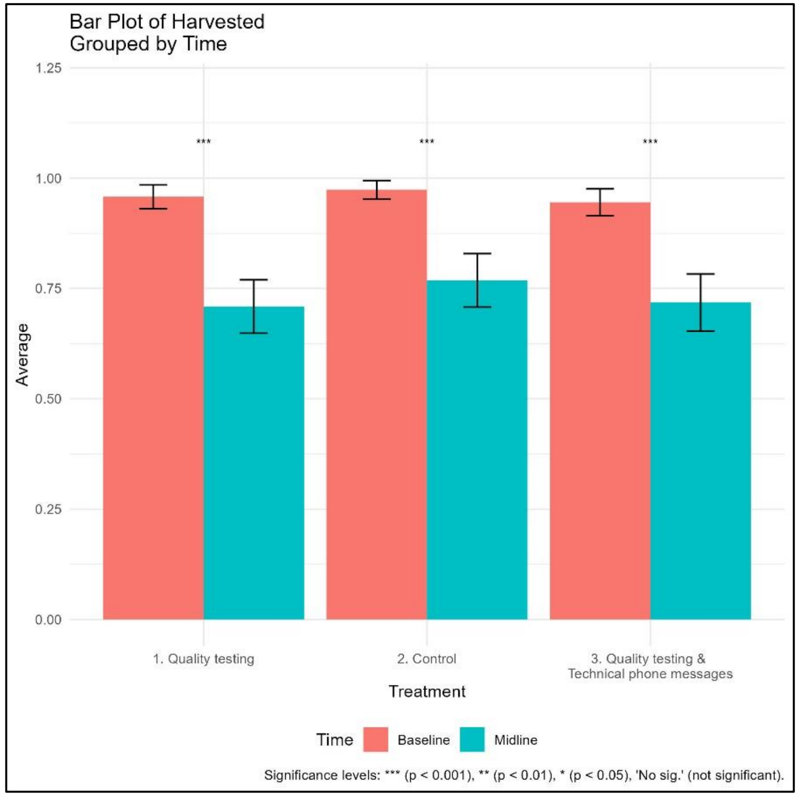
OLS reg. results show no stat. sig. effect of treatments

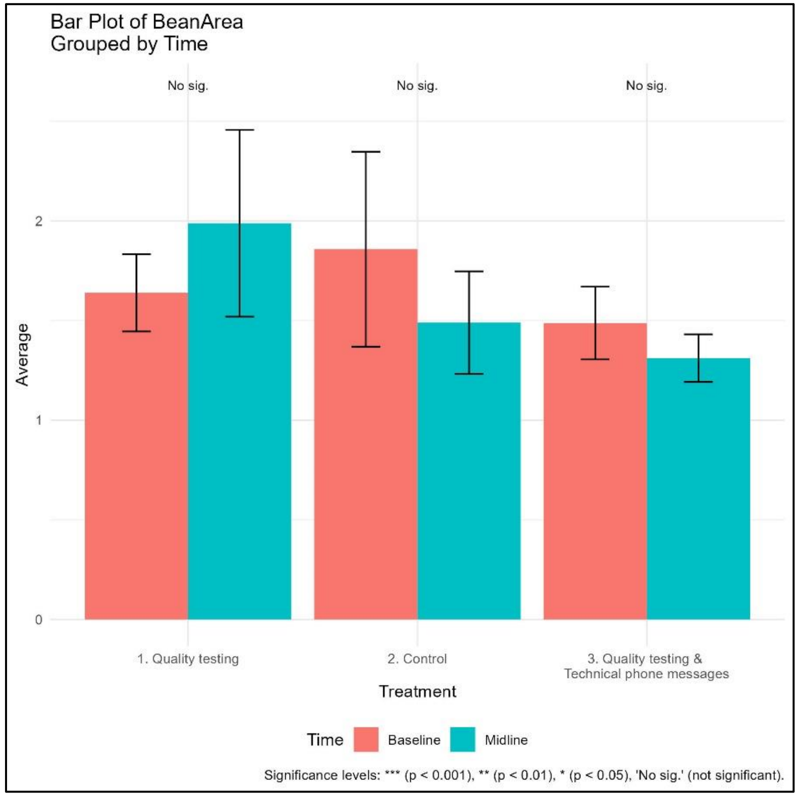
Main challenge was weather

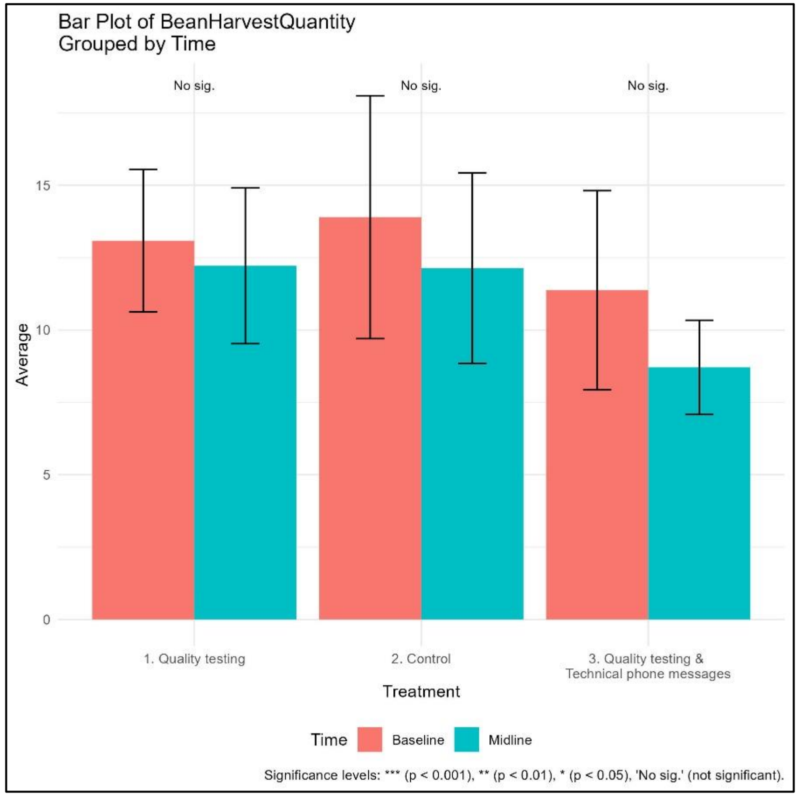




Main challenge was weather







At midline more farmers reported not growing beans or total crop failure

Slightly smaller bean areas planted and lower harvest (though not stat. sig.)

Bean pilot results

But… quality testing results are encouraging

Quality parameter	lb discount (estimated) First round (n=128)	Second round (n=143)	p-value
Grain moisture	10.21 (17.40)	12.04 (21.27)	0.4
Damaged grain	4.23 (8.58)	1.72 (3.71)	0.003***
Germinated grain	2.19 (7.89)	0.65 (1.54)	0.032**
Impurities	1.92 (5.15)	0.58 (0.94)	0.005***
Broken grain	1.92 (5.69)	0.55 (1.33)	0.009***
Total discount	25.07 (38.93)	25.02 (33.82)	>0.9
% discount over total sales	0.07 (0.05)	0.04 (0.03)	<0.001***

- **Positive effect of innovations on individual grain quality parameters**
- **Grain moisture is driving discounts (negatively and away)**
- **The proportion of discounts out of total sales decreased**

	lb discount (estimated)					
	Quality testing			Quality testing & Technical phone msj		
Quality parameter	First round (n=65)	Second round (n=82)	p-value	First round (n=63)	Second round (n=61)	p-value
Grain moisture	11.37 (21.94)	12.48 (22.25)	0.8	9.02 (10.98)	11.45 (20.05)	0.4
Damaged grain	4.14 (10.21)	1.56 (2.63)	0.051*	4.32 (6.57)	1.93 (4.81)	0.022**
Germinated grain	1.32 (3.33)	0.80 (1.93)	0.3	3.09 (10.70)	0.46 (0.69)	0.055*
Impurities	2.08 (5.90)	0.78 (1.14)	0.085*	1.75 (4.29)	0.32 (0.43)	0.011**
Broken grain	2.14 (6.07)	0.75 (1.70)	0.077*	1.70 (5.30)	0.29 (0.44)	0.040**
Total discount	26.26 (46.07)	27.28 (36.47)	0.9	23.84 (30.18)	21.97 (29.92)	0.7
% discount over total sales	0.07 (0.04)	0.04 (0.03)	<0.001***	0.08 (0.06)	0.04 (0.03)	<0.001***

Qualitative results

- **Farmers:** learned about their grain quality (technical vs. traditional methods) ➔ potentially better understanding of effect of practices on quality; and discounts
- **Associations**: strengthened the support they provide to farmers & increased staff's capacity (technical knowledge and use of digital tools
- **Both associations** plan to continue implementing both innovations (one is in the process of presenting this to their board)

Although we have not detected a significantly positive effect of the innovations on the outcome variables of interest, the associations reported better harvest in 2024 (because of better rains)… and quality testing results are positive… we will update analysis with endline

20 YEARS HarvestPlus

Farmer and consumer adoption of biofortified crops and foods: the role of seed pack labelling on WTP

Bho Mudyahoto – Head, M&E IFPRI-HarvestPlus

December 10th, 2024

Rethinking Food Markets for Inclusion and Sustainability
Science, Innovation and Policy Symposium

The focus of the presentation

1. The type of impact we want at different levels
2. Measuring adoption and consumption of biofortified crop varieties and foods as a measure of scaling success
3. The methods and results we have to date
4. How does seed labelling contribute to accelerated scaling – as a driver for adoption

Biofortified varieties released → Planting material delivered → Farmers grow & share → People consume

Implementation monitoring
custom developed tools and platforms

Outcome monitoring
monitoring surveys, adoption surveys, consumption surveys, models

Impact measurement
models and impact evaluations – MN intake

Output Indicators

Outcome Indicators

Impact Indicators

Census data → Surveys → Modelling

- NR Adoption Surveys (AS)
- NR Consumption Surveys (CS)

What we measure with adoption and consumption studies

Some of the key dimensions of varietal adoption/food consumption and related indicators:

- Awareness - % that is aware of (biofortified crops/foods and benefits)
- Varietal penetration (incidence of adoption) - % of HH growing biofortified varieties
- Extent of replacement (intensity of adoption) - share of planted [crop] area that is allocated to biofortified varieties
- Food system transformation - share/absolute quantity, of harvested crop that is biofortified
- Consumption at HH level – Qty. allocated for home consumption by growers
- Use of BF food (incidence) - #/% of population eating biofortified foods (on-farm and off-farm)
- Level of intake - mean per capita consumption at farm HH level
- Supply to the market - quantity sold to the market by growers

What we measure with consumption studies?

Some of the key dimensions of adoption and related indicators:

- Awareness - % that is aware of (biofortified crops/foods and benefits)
- Varietal penetration (incidence) - #/% of HH growing biofortified varieties
- Depth (extent of replacement) - share of planted area that is allocated to biofortified varieties
- Consumption at HH level – Qty. allocated for home consumption by growers
- Use of BF food (incidence) - #/% of population eating biofortified foods
- Level of intake - mean per capita consumption at farm HH level
- Supply to the market - quantity sold to the market by growers

Iron Bean production and consumption in Zimbabwe

- First iron bean variety released in 2010 as NUA45 – 2 varieties by 2022
- At least 7 seed companies are licensed to produce and market NUA45
- We carried out a NR adoption (with elements of consumption) study, in 2022 -

  “Assessing the adoption and production of iron beans (NUA45) in Zimbabwe”
- In addition to the adoption (and consumption) study, we carried out a willingness to pay experiment to better understand the additional drivers and barriers of adoption
- In our experiment, we labelled the biofortified variety in two ways:
  - one version included only the variety name (as it is currently marketed)
  - the other version included an additional information ‘iron and zinc enriched’ label (a novel marketing feature).

Results – proportion of bean growers that planted iron bean (incidence adoption) in Zimbabwe

Descriptive statistics	Manicaland (N=970)	Mashonaland Central (N=1743)	Mashonaland East (N=529)	Mashonaland West (N=591)	Masvingo (N=309)	Matabeleland South (N=14)	Midlands (N=151)	Overall (N=4307)	P value
Farming households that grew iron bean varieties in 2021/22 season (%)									
Yes	47.63	33.51	15.88	8.63	31.07	0.00	1.99	29.72	0.0000
No	52.37	66.49	84.12	91.37	68.93	100.00	98.01	70.28	

Results - comparison of bean varietal penetration (incidence adoption) across provinces in Zimbabwe

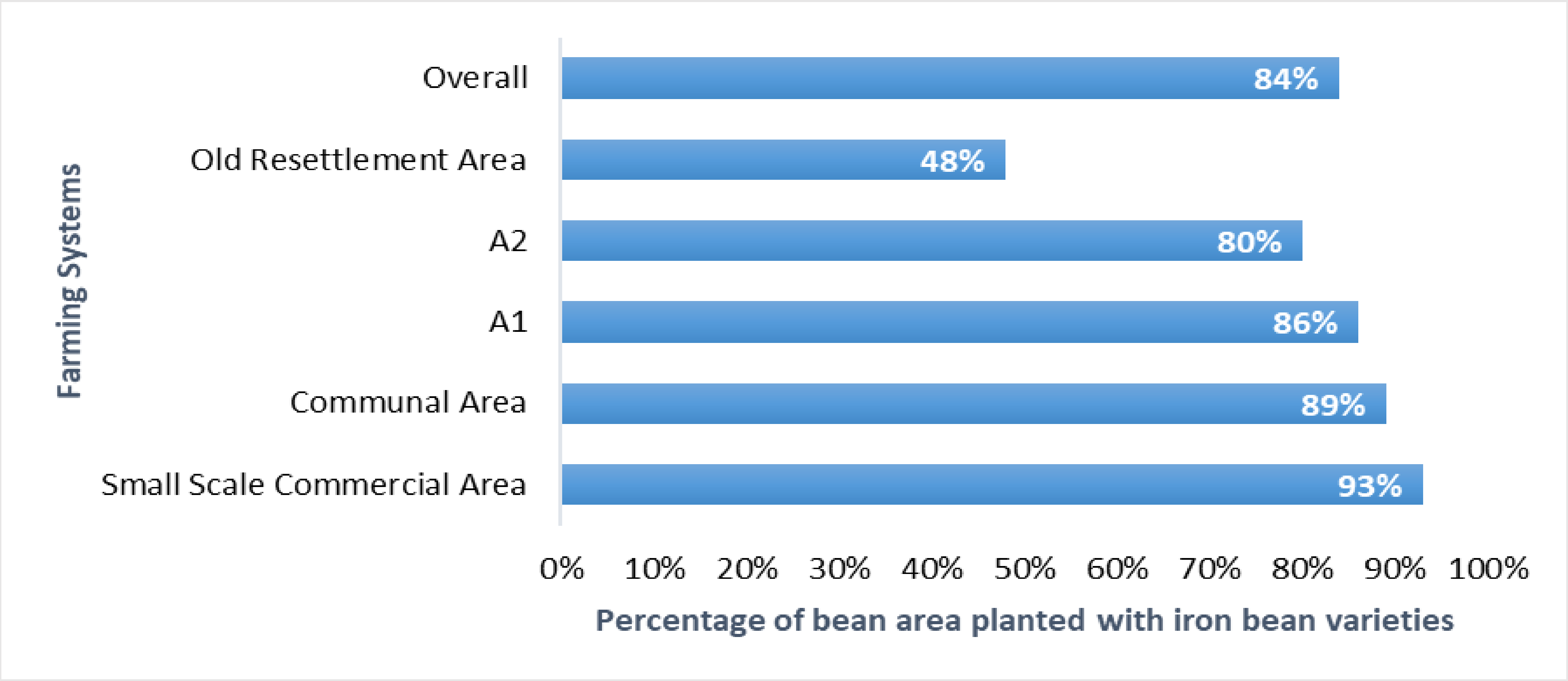
Comparison of bean varietal penetration across provinces

Bean variety	Manicaland (N=312)	Mashonaland central (N=296)	Mashonaland East (N=181)	Mashonaland West (N=314)	Masvingo (N=127)	Matebeleland South (N=8)	Midlands (N=24)	Overall (N=1262)	P value
Gloria	10.14	39.03	59.05	67.41	56.06	100.00	77.10	44.81	0.0000
NUA45	48.36	25.50	30.38	10.99	35.07	0.00	14.98	28.73	
Other sugar bean varieties	40.81	32.71	7.66	15.80	8.82	0.00	7.92	23.78	
Ngoda	0.69	2.75	2.91	5.80	0.06	0.00	0.00	2.68	

Iron bean adoption by gender - Zimbabwe

Variable	Sex of the household head Male (N=4,194)	 Female (N=2,006)	Overall (N=6,200)	P value
Proportion (%) of farming households that grew common beans in 2021/22 season	69.46 (4,194)	69.49 (2,006)	69.47 (6,200)	0.978
Proportion (%) of bean growing farming households that grew iron beans in 2021/22 season	27.50 (2,913)	34.36 (1,394)	29.72 (4,307)	0.000

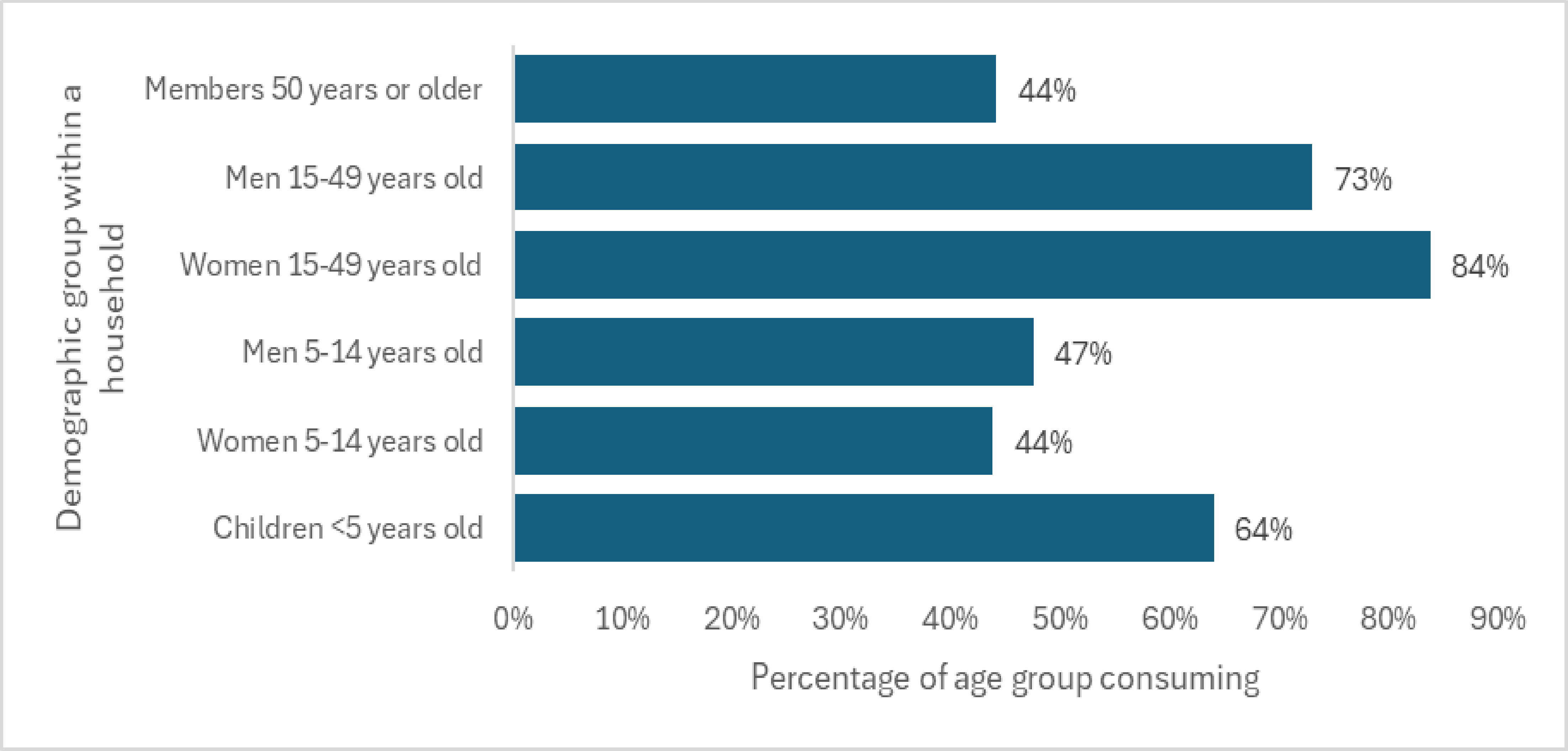
Proportion of bean (all varieties) area allocated to iron bean varieties by adopters - Zimbabwe



Comparison of bean production and utilization across provinces, by adopter type - Zimbabwe

Seed Source	Manicaland (N=312)	Mashonaland Central (N=296)	Mashonaland East (N=181)	Mashonaland West (N=314)	Masvingo (N=127)	Matabeleland South (N=8)	Midlands (N=24)	Overall (N=1262)
Mean quantity of beans harvested (kg)								
Non – iron bean varieties	123.61	511.11	188.52	319.54	186.75	54.50	264.48	283.40
Iron bean varieties	173.73	241.46	299.57	717.29	153.75	-	277.65	258.43
Overall	148.59	440.55	223.27	363.78	176.23	54.50	266.77	276.07
P value	0.0919	0.0040	0.2494	0.0791	0.5732	-	0.9384	0.5335
Mean quantity of harvest saved for seed (kg)								
Non – iron bean varieties	10.07	23.29	33.71	32.30	14.92	3.57	5.07	23.61
Iron bean varieties	9.93	33.33	30.57	31.85	19.24	-	6.48	20.08
Overall	9.99	25.94	32.70	32.24	16.35	3.57	5.32	22.55
P value	0.9462	0.5375	0.8675	0.9714	0.6293	-	0.8182	0.4589
Mean quantity of harvest saved for consumption (kg)								
Non – iron bean varieties	45.79	103.62	38.39	101.67	37.72	37.29	105.91	76.26
Iron bean varieties	49.93	50.91	61.86	152.53	54.13	-	124.78	63.61
Overall	47.89	89.73	45.90	107.43	43.16	37.29	109.30	72.47
P value	0.6615	0.0002	0.2346	0.3139	0.2798	-	0.8296	0.1819
Mean quantity of harvest sold (kg)								
Non – iron bean varieties	71.17	369.73	105.74	166.99	129.57	16.29	156.21	175.36
Iron bean varieties	110.81	146.32	193.34	528.71	74.09	-	146.40	168.36
Overall	91.31	310.84	133.78	207.93	111.17	16.29	154.44	173.26
P value	0.1292	0.0082	0.2461	0.0983	0.2960	-	0.9161	0.8422

Intra-household allocation of iron bean food - Zimbabwe



Seed pack labelling and information by product – WTP study Zimbabwe

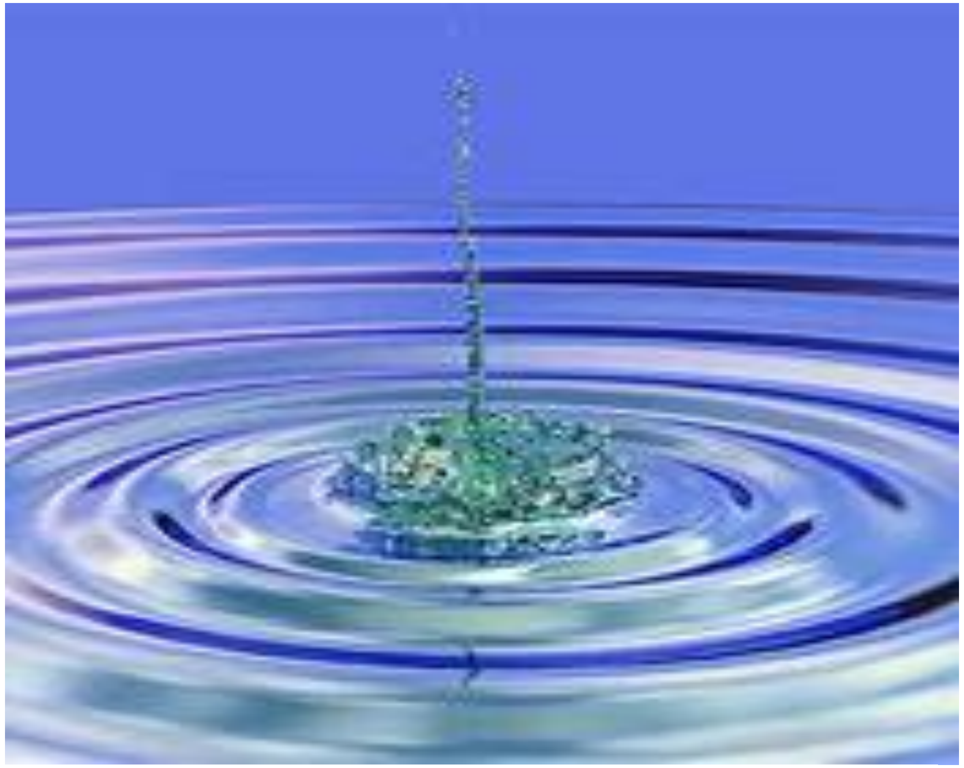
Information Type	Product 1	Product 2	Product 3
Variety Name	Gloria	NUA45	NUA45
Company	ARDA	ARDA	ARDA
Size of Seed pack	2kg	2kg	2kg
Color of seed	Cream	Purple-mottled	Purple-mottled
Biofortified *(credence attribute)*	No	Yes	Yes
Additional Label	No	No	Iron and Zinc Enriched

Does labelling and inclusion of additional information on seed packs affect WTP?

Two key results from the WTP study:

- WTP for the new biofortified seeds exceeded WTP for the benchmark non-biofortified bean seed.
- Second, within the biofortified category, seeds with the nutritional label of ‘iron and zinc enriched’ receive a higher WTP than seeds without the label.

The catalytic splash and ripple effect



Thank you!

BREAK

3.30 → 4.00

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Parallel Session 5

Inclusive agribusiness models and market information

Moderator: Rajalakshmi Nirmal, IFPRI

Presentations:

- **Girma Kassie**, *ICARDA* and **Nicholas Minot**, *IFPRI*
- **Bjorn van Campenhout**, *IFPRI* and **Richard Ariong**, *IFPRI*
- **Sarah Kariuki**, *CIMMYT*

Discussants:

- **Gashaw Abate**, IFPRI
- **Wonekha Deogracious**, *MAIF, Uganda (Online)*
- **Samson Akankiza Mpiira**, *Executive Director, DDA, Uganda*
- **Behailu Nigussie Demeke**, *Deputy CEO of the Ethiopian Commodity Exchange*

CGIAR

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Rethinking
Food Markets

Improving the bargaining power of smallholder sesame producers in Ethiopia through information and collective marketing

Kassie, G.T., G. Abate, Y. Worku, W. Asnake, S. Mesfin, and N. Minot

Science, Innovation and Policy Symposium
10-11 December 2024
IFPRI HQ, Washington D.C.

Motivation – why sesame?

General

- Potential of agricultural development was studied recently for 44 SSA countries and **Ethiopia was one of the three countries – along with Nigeria and Tanzania** – that comprise half of SSA's agricultural potential (Goedde et al., 2019).

Specific

- An empirical analysis that considered all value chains to be equally important for the economy prioritized
  - **oilseeds,**
  - fruits/tree crops,
  - vegetables,
  - tobacco/cotton/tea and cattle value chains in Ethiopia (Benfica and Thurlow, 2017).

Motivation – why sesame?

- Sesame is the main/primary oil crop and the second most exported agricultural commodity in Ethiopia.
- Ethiopia makes around 2.6% of the global sesame production (FAOSTAT, 2020).
- Sesame contributes about 2.3% of grain production with a total production of about 20 thousand tons in the 2018/2019 production season.
- Main growing areas are the lowlands of northwest Ethiopia (80% of production) (CSA, 2020).

Motivation – why sesame?

- **Key constraints of the sesame value chain**
  - Weather variability,
  - Low adoption of technologies,
  - Poor finance and infrastructure,
  - High production and transaction/marketing costs,
  - Low crop diversity in the sesame growing areas - resulted in high disease infestation,
  - There is no sesame seed system – applies to all oil crops, and
  - Heavy government intervention in sesame marketing.
    - ECX – a public institution – is the key actor in sesame marketing – including exporting.
    - Excessive and unpredictable foreign currency control mechanisms

The innovation

- **Components**
  - Sesame market information (MI)
    - Data collected every week
    - Information sent to famers every two weeks
  - Collective action (CA) – training and supporting sesame growers to collectively act voluntarily.
- **Objective**
  - Measuring the effect of MI and CA on sesame productivity, the average price received by the producers, and farm income using a randomized control trial.

The Experiment

- **Location**
  - Central Gondar: Tach Armachiho and Tsegede
  - West Gondar: Metema and Mirab Armachiho
- **Villages and households**
  - 26 villages (520 households): Market information
  - 26 villages (520 households): Market information + collective action
  - 26 villages (520 households): Control
- **Stakeholder engagement**
  - Actively working with Gondar ARC, District Offices of Agriculture, and DAs.

Expected outcomes

- Collective action
  - Reduction in transaction cost.
  - Increase in average output price per unit.
- Digital information services
  - Increase in sesame yield.
  - Increase in cash income from crop production.

Timeline of the experiment

- **Oct. 2022** — Stakeholder workshops in Gondar and Addis Ababa
- **Nov/Dec 2022** — Scoping study of the sesame value chain in Ethiopia
- **Nov/Dec 2023** — Baseline survey [1560 sesame growers]
- **May 2004** — Implementation of the experiment
- **Oct. 2024** — Stakeholder workshop on innovation scaling preparedness and strategy
- **Oct/Nov 2024** — Endline survey

Analysis plan

- **Interest is in individual level effects of MI and MI&CA.**
  - We are running individually randomized group-treatment (IRGT) trial.
- The analysis will measure ITT and LATE/CACE, + attrition
  - ITT (assuming full compliance = ATE)
    - Mixed effects model – unobserved heterogeneities at village and time-period levels.
  - LATE/CACE
    - 2SLS
  - Attrition
    - We will conduct joint test whether baseline characteristics vary systematically by trt and attrition status jointly.

Baseline characteristics - outcome variables Control vs MI

Variable	N (Control)	N (MI)	Mean (Control)	Mean (MI)	Mean Diff	p-value
Total annual sesame harvest in ton	**516**	**515**	**0.90**	**0.98**	**0.08**	**0.30**
Total income from sesame production in 1000 Birr	**516**	**514**	**78.38**	**85.10**	**6.72**	**0.32**
Household food expenditure per capita in the last seven days	**520**	**520**	**798.65**	**955.95**	**157.30**	**0.24**

Baseline characteristics - outcome variables Control vs MI&CA

Variable	N (Control)	N (MI and CA)	Mean (Control)	Mean (MI and CA)	Mean Diff	p-value
Total annual sesame harvest in ton	516	518	0.90	0.91	0.01	0.90
Total income from sesame production in 1000 Birr	516	517	78.38	79.24	0.85	0.88
Household food expenditure per capita in the last seven days	520	520	798.65	1009.82	211.17	0.34

Baseline characteristics - explanatory variables (D) Control vs MI

Variable	N (Control)	N (MI)	Mean (Control)	Mean (MI)	Mean Diff	p-value
The HH has sufficient access to market information: 1=Yes	520	519	0.16	0.19	0.03	0.19
The HH has credit: 1=Yes	520	520	0.50	0.42	-0.08	0.01
HH has used fertilizer in crop production: 1=Yes	520	520	0.14	0.17	0.03	0.17
HH has used tractor in sesame production: 1=Yes	520	520	0.19	0.19	-0.01	0.81

Baseline characteristics - explanatory variables (C) Control vs MI

Variable	N (Control)	N (MI)	Mean (Control)	Mean (MI)	Mean Diff	p-value
Distance to market [walking minutes]	520	520	41.94	33.46	-8.49	0.01
Literacy (# completed grade by the HHH)	520	520	5.39	4.62	-0.78	0.00
Age of the Household head [years]	520	520	40.75	42.47	1.72	0.01
Farmland allocated to sesame: ha	520	520	2.87	3.00	0.13	0.37
Fertilizer (Urea & DAP/NPS) used for sesame: kg	517	514	24.47	19.01	-5.47	0.76
Labor (family + hired) used for sesame: MD	520	520	74.97	72.58	-2.39	0.58

Baseline characteristics - explanatory variables (D) Control vs MI&CA

Variable	N (Control)	N (MI & CA)	Mean (Control)	Mean (MI & CA)	Mean Diff	p-value
The HH has sufficient access to market information: 1=Yes	520	519	0.16	0.14	-0.02	0.44
The HH has credit: 1=Yes	520	520	0.50	0.49	-0.01	0.76
HH has used fertilizer in crop production: 1=Yes	520	520	0.14	0.10	-0.04	0.05
HH has used tractor in sesame production: 1=Yes	520	519	0.19	0.17	-0.03	0.26

Baseline characteristics - explanatory variables (C) Control vs MI&CA

Variable	N (Control)	N (MI & CA)	Mean (Control)	Mean (MI & CA)	Mean Diff	p-value
Distance to market [walking minutes]	520	520	41.94	38.52	-3.43	0.34
Literacy (# completed grade by the HHH)	520	519	5.39	5.20	-0.19	0.48
Age of the Household head [years]	520	520	40.75	41.57	0.82	0.21
Proportion of farmland allocated to sesame: %	520	520	2.87	3.02	0.15	0.26
Fertilizer (Urea & DAP/NPS) used for sesame: kg	517	515	24.47	4.43	-20.05	0.20
Labor (family + hired) used for sesame: MD	520	520	74.97	79.01	4.04	0.60

The balance of key variables between clusters is good - implying reliable randomization.

Endline survey

- Started in mid November.
- We have interviewed about 942 (+60%) of the 1560 households.
- Considerable level of attrition observed. Reasons:
  - **Total displacement of the household**
    - Family members of armed forces are displaced due to fear of retaliation and potential imprisonment.
  - **Imprisonment**: several farmers have been imprisoned for various reasons related to the war, including direct participation in hostilities.
  - Farmers close to active war zone **could not travel** to “safer” areas where interviews are being held.
  - Farmers in remote villages, whose members are involved with the waring parties **hesitate to travel** for fear of retaliation.
- Planned to be finalized in the third week of December.
- Reports expected to be available in Q1 2025.


Thank you!

Annex

Analysis plan

- **Interest is in individual level effects of MI and MI&CA.**
  - We are running individually randomized group-treatment (IRGT) trial.
- The analysis will measure ITT and LATE/CACE, + attrition
  - ITT (assuming full compliance = ATE)
    - We pre and post intervention data, $t = 1,2$, on $i = 1, \ldots, N$ sample of farmers clustered in villages $k = 1, \ldots, K$, and treatment arms $\gamma = 1,2, \& \ 3$ - where 1 is control and 2 is MI, and 3 is MI&CA, the ATE on income from sesame production, $y_{jk\gamma t}$, (our design outcome) can be estimated as

$$y_{ik\gamma t} = \mu + \boldsymbol{\beta_1 D_{\gamma t}} + \nu_k + \upsilon_{kt} + \epsilon_{ik\gamma t}$$

    - Where μ is the overall mean, $\boldsymbol{D}_{\gamma t}$ is a three-level treatment indicator for control and two treatment conditions, β_1 is the treatment effect, $\nu_k \sim N(0, \sigma_\nu^2)$ is the between-village random effect, $\upsilon_{kt} \sim N(\tau_t, \sigma_t^2)$ is the within-village, between time-period random effect, and $\epsilon_{ik\gamma t} \sim N(0, \sigma_\epsilon^2)$.
      - The parameters to be estimated are $\Theta = [\mu, \boldsymbol{\beta}_1, \sigma_\alpha^2, \sigma_t^2\ \tau_1, \tau_2]$.
      - The treatment effects of primary interest are $\boldsymbol{\beta}_1 = \left[\beta_{1,MI}, \beta_{1,MI\&CA}\right]$, implying mean differences between the arms and the control.

Analysis plan…

- LATE/CACE [focus on one-sided non-compliance]
- 2SLS

Let $Z_{ik\gamma t}$ is randomized treatment assignment and $T_{ik\gamma t}$ is treatment received taking the value 1 if the individual actually received the treatment and 0 otherwise.

- **First stage [estimating prob of treatment received]**

$$logit(\Pr(T_{ik\gamma t} = 1) = \delta_0 + \delta_1 Z_{ik\gamma t} + \boldsymbol{\delta X_{ik\gamma t}} + \zeta_{ik\gamma t}$$

where δ_1 is the compliance effect (effect of trt assignment on actual trt received), $X_{ik\gamma t}$ covariates (e.g., baseline characteristics) that influence compliance, and $\zeta_{ik\gamma t}$ is first stage error term.

- **Second stage [outcome model]**

$$y_{ik\gamma t} = \mu + \rho_1 \hat{T}_{ik\gamma t} + \boldsymbol{\rho X_{ik\gamma t}} + \nu_k + \upsilon_{kt} + \eta_{ik\gamma t}$$

Where $\hat{T}_{ik\gamma t}$ is predicted value of $T_{ik\gamma t}$ from the first stage above.

Analysis plan …

- **Attrition**
  - Missing data problem
  - The focus will be whether attrition is informative [not random]
  - We will conduct joint test whether baseline characteristics vary systematically by trt and attrition status jointly.
    - We will model attrition as an outcome itself.

$$\psi_{ik} = \alpha + \lambda_1 T_{\gamma k} + \lambda_2 X_{ik} + \lambda_3 \left(T_{\gamma k} * X_{ik}\right) + \varepsilon_{ik}$$

where λ_1 direct effect of treatment on attrition, λ_2 effect of baseline characteristics on attrition, and λ_3 Interaction term capturing whether the relationship between baseline.

Science session: WP2 Uganda

Innovations to improve quality in dairy value chains

Bjorn Van Campenhout, Sarah Kariuki, Richard Ariong, Jordan Chamberlin, Patrick Vudriko

CGIAR

INITIATIVE ON

Rethinking Food Markets

Prologue

For Uganda dairy value chain case study under WP2, scoping pointed out two key issues: quality and Tick Borne Diseases (TBD)

Easy to find solutions for quality issues, much more challenging to find solutions for TBD – more scoping was needed

In this presentation: focus on quality problem

Background: dairy value chain in Uganda

- FDI in Mbarara, often from India – cluster of processors creating demand
- Policy reforms that favor the sector – privatization
- Low cost of production
- Increase in productivity

Dairy now third biggest export earner for Uganda
Local dairy consumption increases – especially in towns

Problem statement, hypotheses & solutions

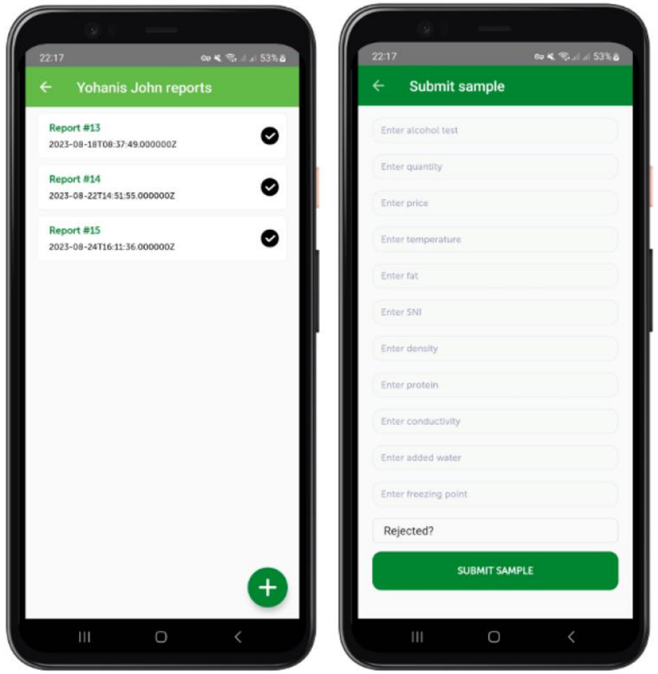
Quality (low fat and low protein content of raw milk) remains a problem. Processors want to pay more for quality & farmers indicate they can increase investment in quality if compensated, yet no market for quality exists.

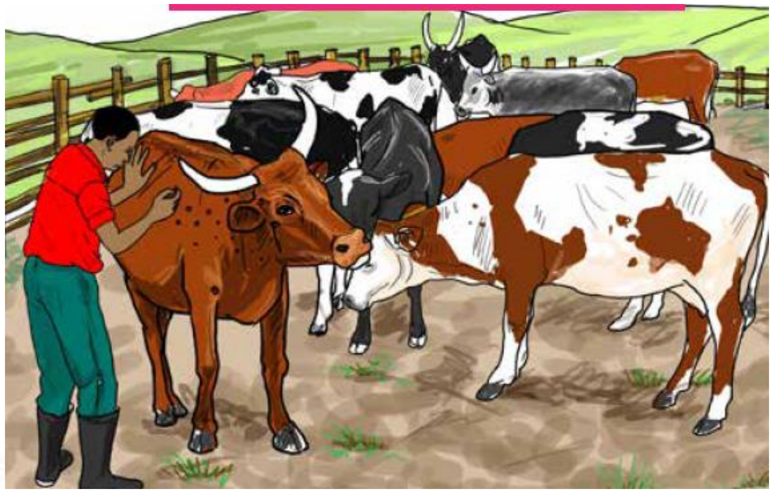
- Hypothesis 1: Quality is not readily observable and milk is bulked making tracking of quality very challenging (testing only happens at processor)
- Hypothesis 2: Farmers interpret quality as milk sanitation while processors are mainly interested in compositional quality

- Solution 1: make milk quality observable throughout the value chain
- Solution 2: sensitize farmers on importance of compositional quality (and how this can be achieved)

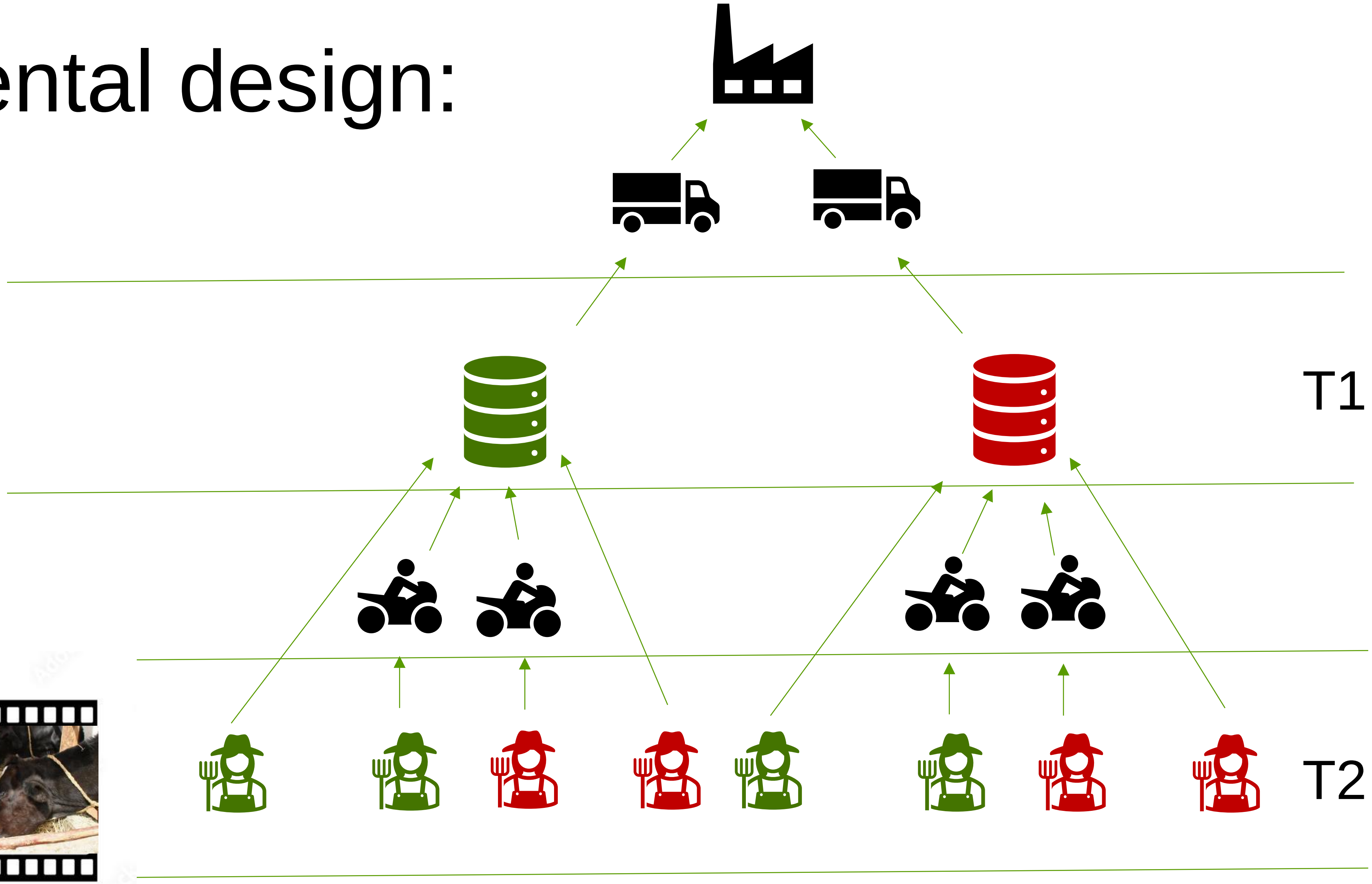
Innovation Bundles

- Innovation bundle 1 (T1): Milk analyzer + training/hotline + tablet with application to track quality + BCC-type poster “get tested!”
- Innovation bundle 2 (T2): Video on management practices to increase quality + handout (cartoons)





Experimental design:



Empirical Specifications

Impact on MCC

$$y_m = \alpha + \beta_{H1}.T1_m + \varepsilon_m$$

Impact on farmer

$$y_{i,m} = \alpha + \alpha_C C_{i,m} + \beta_{H2}.T1_m + \beta_{H3}T2_i + \beta_{H4}T2_i.T1_m + \beta_{H2C}.T1_m.C_{i,m} + \beta_{H3C}T2_i.C_{i,m} + \beta_{H4C}T2_i.T1_m.C_{i,m} + \varepsilon_{i,m}$$

Hypotheses:

- making quality visible at the MCC level increases outcomes at MCC level ($\beta_{H1} > 0$)
- making quality visible at the MCC level increases outcomes at farmer level ($\beta_{H2} > 0$)
- providing information on how to increase milk quality increases outcomes for farmers ($\beta_{H3} > 0$)
- Combined treatment of making quality visible at the MCC level and providing information on how to increase milk quality increases outcomes for farmers ($\beta_{H4} > 0$)

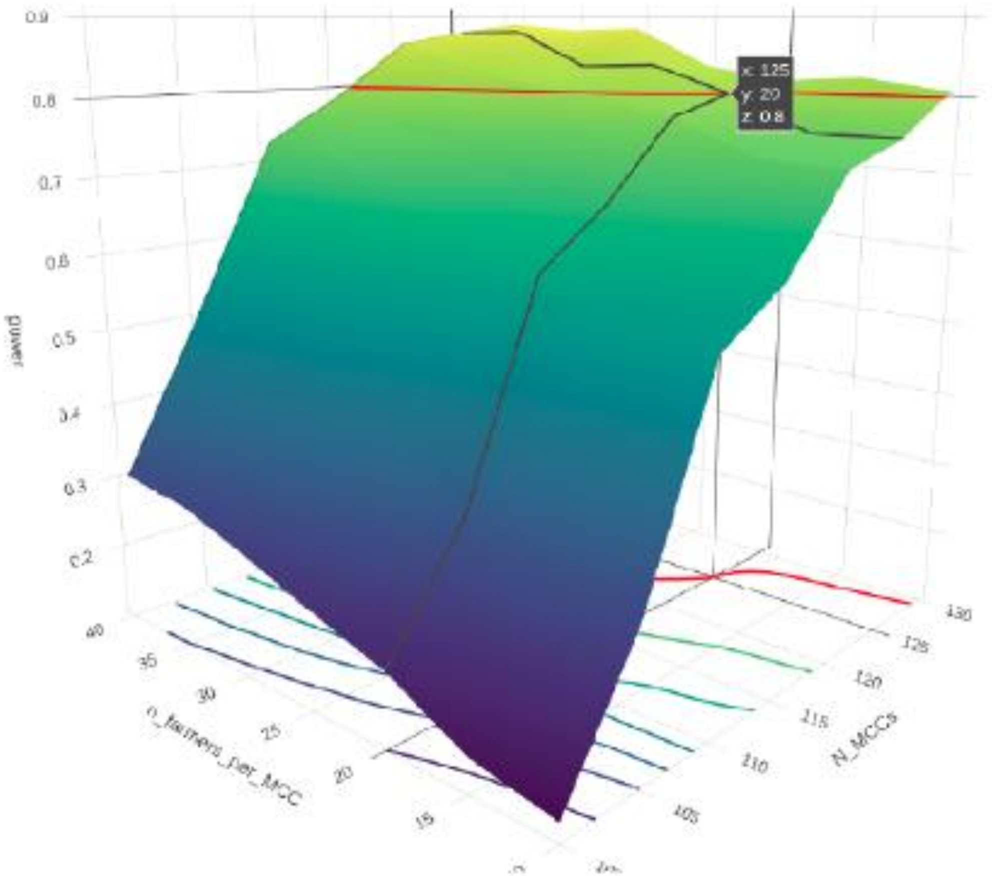
Heterogeneity at farmer level:

- Does making quality visible at the MCC level affect indirectly connected farmers differently ($\beta_{H2C} \neq 0$).
- Does providing information on how to increase milk quality affect indirectly connected farmers differently ($\beta_{H3C} \neq 0$).
- Does Combined treatment of making quality visible at the MCC level and providing information on how to increase milk quality affect affect indirectly connected farmers differently ($\beta_{H4C} \neq 0$).

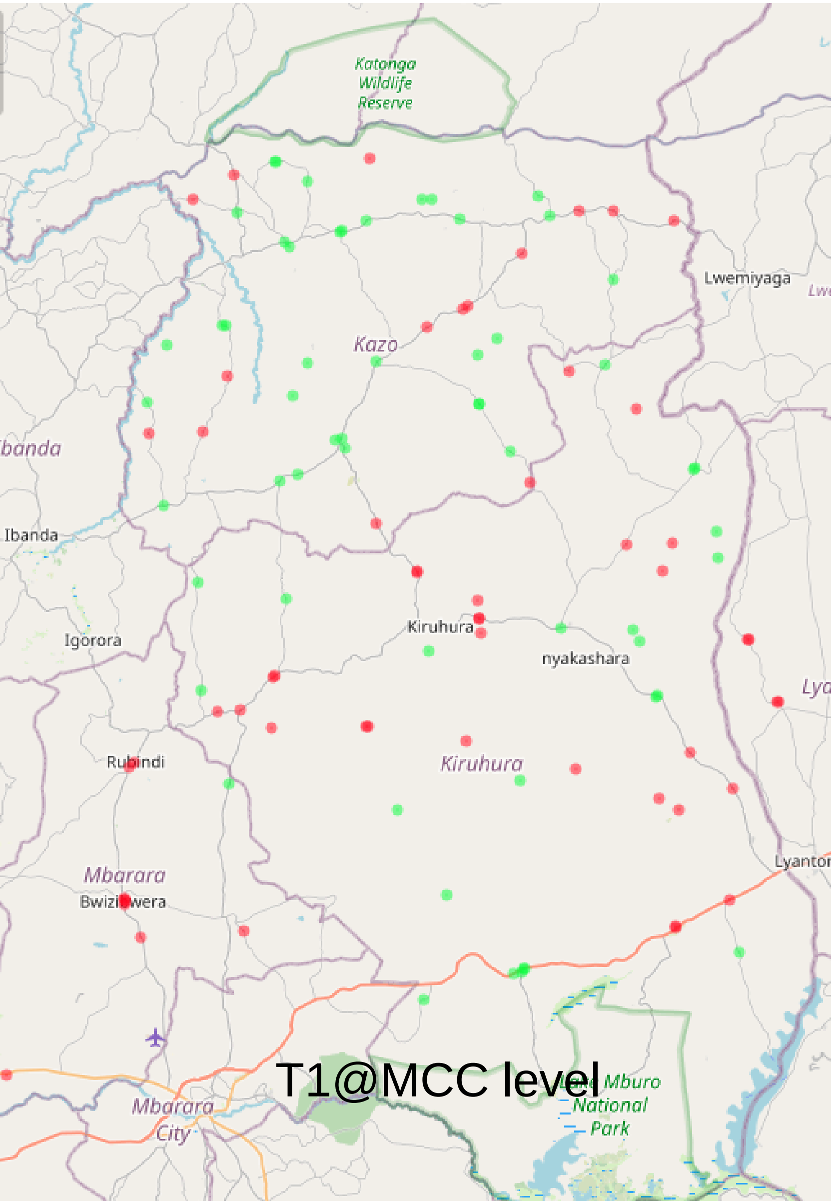
Power calculations (simulations)

Problem: determine number of MCCs (N) and number of farmers per MCC (n) to power the entire design
Outcome: price of milk

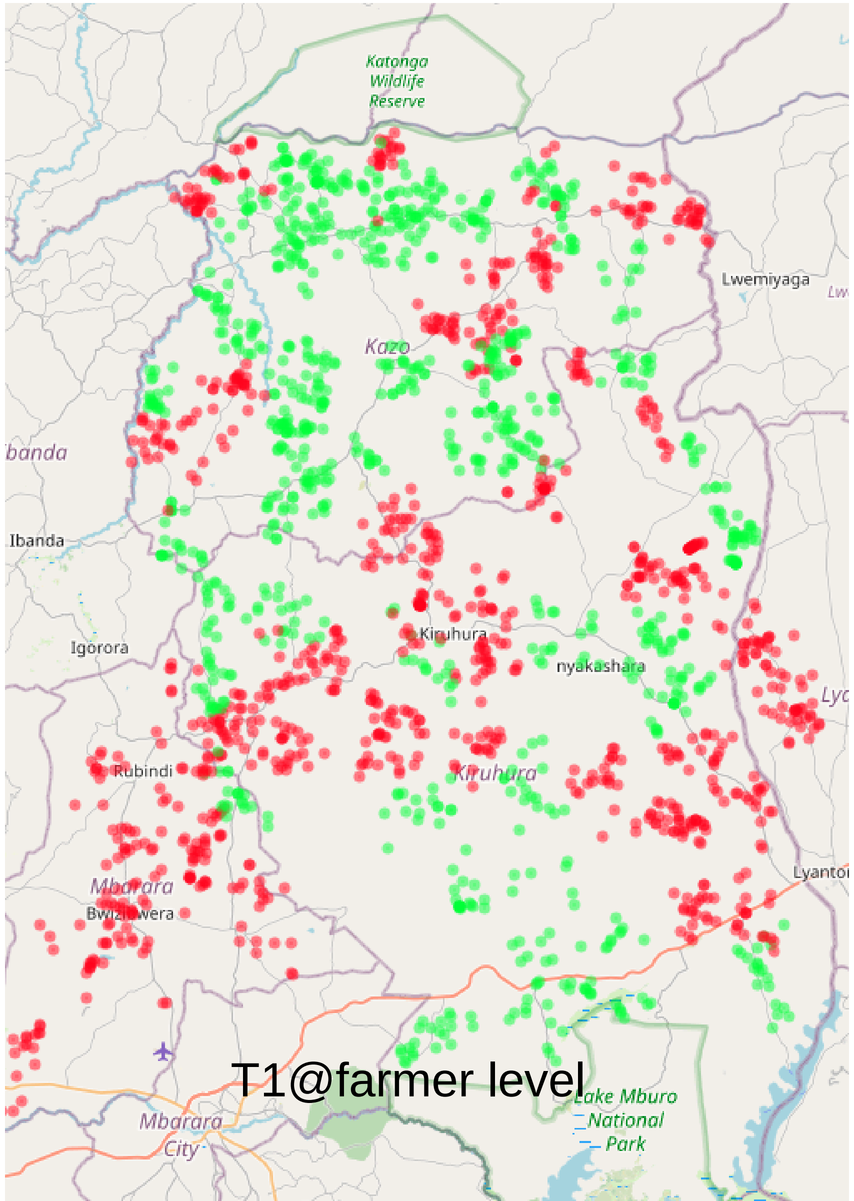
1. Define MDE sizes of T1 (30 UGX at MCC level, 40 UGX at farmer level) and T2 (25 UGX at farmer level) and interaction (50 UGX at farmer level).
2. Generate N prices at the MCC level and N*n prices at the farmer level, the latter being clustered at the MCC catchment area level (mean price =1000 UGX per liter, SD higher at farmer level); add MDE to half of the sample following the design
3. Run the two regressions and check if all four coefficients are significant
4. Do this 10000 times and calculate the how often all four coefficients are significant (divide by 10000 to get share – this is your power of your Nxn sample)
5. Repeat this for different N and n



Sample



Katonga Wildlife Reserve
Lwemiyaga
Kazo
Ibanda
Igorora
Kiruhura
nyakashara
Rubindi
Kiruhura
Mbarara
Bwizibwera
Lyantonde
Mbarara City
Lake Mburo National Park
T1@MCC level



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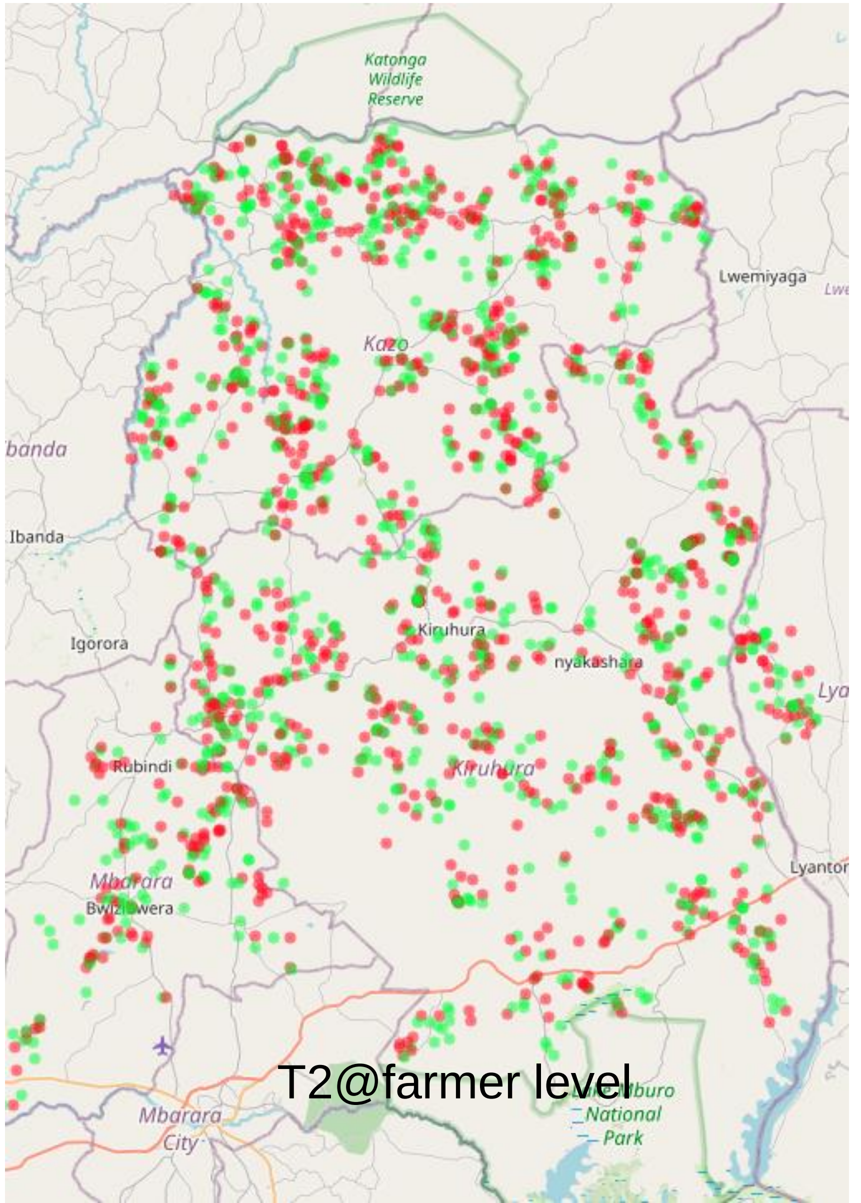
Lyantonde
Mbarara City
Lake Mburo National Park
T1@farmer level



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Kiruhura
nyakashara
Rubindi
Kiruhura
Mbarara
Bwizibwera
Lyantonde
Mbarara City
National Park
T2@farmer level

Table 1: Balance table

	mean ctrl	analyzer	video	bundle	nobs
	milk collection centers				
Is this milk collection center (part of a) cooperative? (yes/no)	0.575	0.133			127
	(0.496)	(0.089)			
Total Capacity of MCC (in liters)	4591.457	438.445			127
	(2451.97)	(426.818)			
Does the MCC pay a premium for quality (yes=1)	0.244	0.012			127
	(0.431)	(0.076)			
Years Experience in MCC	9.611	-1.778			126
	(8.068)	(1.571)			
Facilitates supply of acaracides? (yes=1)	0.543	0.039			127
	(0.5)	(0.092)			
	dairy farmers				
Household Head Age (years)	54.135	-1.756	-2.665	3.428	2229
	(13.494)	(2.632)	(2.168)	(3.189)	
Current Total herd size (number)	68.037	-1.157	-9.264	-1.749	1948
	(80.139)	(16.732)	(13.032)	(20.318)	
Number of improved animals in total herd (share)	75.65	-1.935	7.569	-0.142	2229
	(85.338)	(20.749)	(18.276)	(21.414)	
Liters milk sold per day (on average in the rainy season) (liters)	63.9	-9.778	-2.473	9.875	2229
	(66.72)	(15.64)	(11.943)	(16.063)	
Average monthly expense (USD) on chemical purchases	71.811	-31.341	-27.857	-0.611	891
	(113.279)	(30.51)	(24.601)	(55.469)	

Note: First column reports control group means (and standard deviations below); **, * and + denote significance at the 1, 5 and 10 percent levels.

Progress

- Baseline data was collected in December 2022 + T2 was done
- Only now milk analyzers have been delivered!
- In two weeks: implement T1 and repeat T2
- Midline (originally planned 6 months after T1) has been postponed to 2024 (budget cuts + slow procurement of milk analyzers)

- For TBD work, scoping report is ready and co-design workshop was held (together with MELIA&SPA team) where we identified some potential innovation bundles
- Future of TBD work is uncertain due to budgetary uncertainty – priority to ongoing field experiment

Thank you

Sarah Kariuki, Richard Ariong, Jordan Chamberlin, Patrick Vudriko

CGIAR Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Disease management and value chain up-grading: tick control in Uganda's dairy value chain

CIMMYT, IFPRI and Makerere University

The issue of Ticks and Tick-Borne Diseases (TTBDs)

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- TTBDs are increasingly becoming a challenge to the fast-growing sector
  - Uganda’s warm and humid environments favor ticks’ survival
  - Extensive grazing systems complicate tick management
  - Shift towards improved breeds which are high yielding but susceptible to TTBDs
  - Failures in chemical control: documented resistance of ticks to existing acaricides

- Implications of TTBDs and acaricide failures for the dairy value chains
  - Productivity loss (ECF diseases, anaplasmosis. , etc.)
  - Loss of income (acaricide & disease treatments)
  - Desperate farmers have resorted to unsanctioned practices, such as mixing acaricides with pesticides, posing risks to human, animal, and environmental health

Chemical control with acaricides

- Acaricides are the most common method for TTBD control due to their fast action against tick populations

- A major risk: *resistance of ticks to acaricides*

- Factors associated with resistance: genetic, **operational**, and biological factors
  - Tick resistance to drugs is inevitable over time due to genetic factors, but proper use of acaricides is key to delaying and managing it

Acaricide: a technical technology

- Effective use requires an understanding of the drugs, their modes of action, tick biology
  - Use of proper application techniques
  - Correct dosage
  - Frequency and timing of treatments
  - Monitoring of resistance
  - Evidence-based recommendations (lab tests)
  - Proper rotation practices
    - Changing from one acaricide type/class to another class with a different mode of action
    - Five classes registered in Uganda: synthetic pyrethroids, amidines, co-formulations of organophosphates and synthetic pyrethroids, organophosphates, and ivermectins

Figure 15: *Showing the different classes of acaricides on the Ugandan market. Under each class are the registered brands on the market*

VETERINARY MEDICINES UPDATES BULLETIN

A technical technology left to farmers

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Before liberalization

- Government-led tick management
  - Use of communal dips
  - Dip scouts managed the dips, including selection of the chemical used, managing a rotation schedule, and zonation to coordinate the chemical used in a given zone
- Pros and cons
  - Expensive for the government but resistance management

Post- liberalization

- Farmer-led tick management
  - Government role restricted to regulation
  - Private sector responsible for drug supply
  - Public extension services to support farmers
- Pros and cons
  - Inadequate support to farmers
  - Incentive misalignment and externalities problem
  - Coordination challenges

Our scoping work on this topic

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

- To understand the challenge of TTBDs
  - Prevalence of TTBDs, prevalence of use of illicit methods, and factors associated with chemical failures
  - Document the effects at the farm level of TTBDs and acaricide failures
  - Asses the role of input markets, specifically drug stores

- Data collection among various actors in the southwestern milk shed
  - Household surveys with 926 farmers
  - Exit interviews with 411 farmers at retail
  - Census with 318 vet drug sellers
  - Mystery shoppers exercise among 249 shops

Some takeaways from our work

Extensive systems that complicate tick control

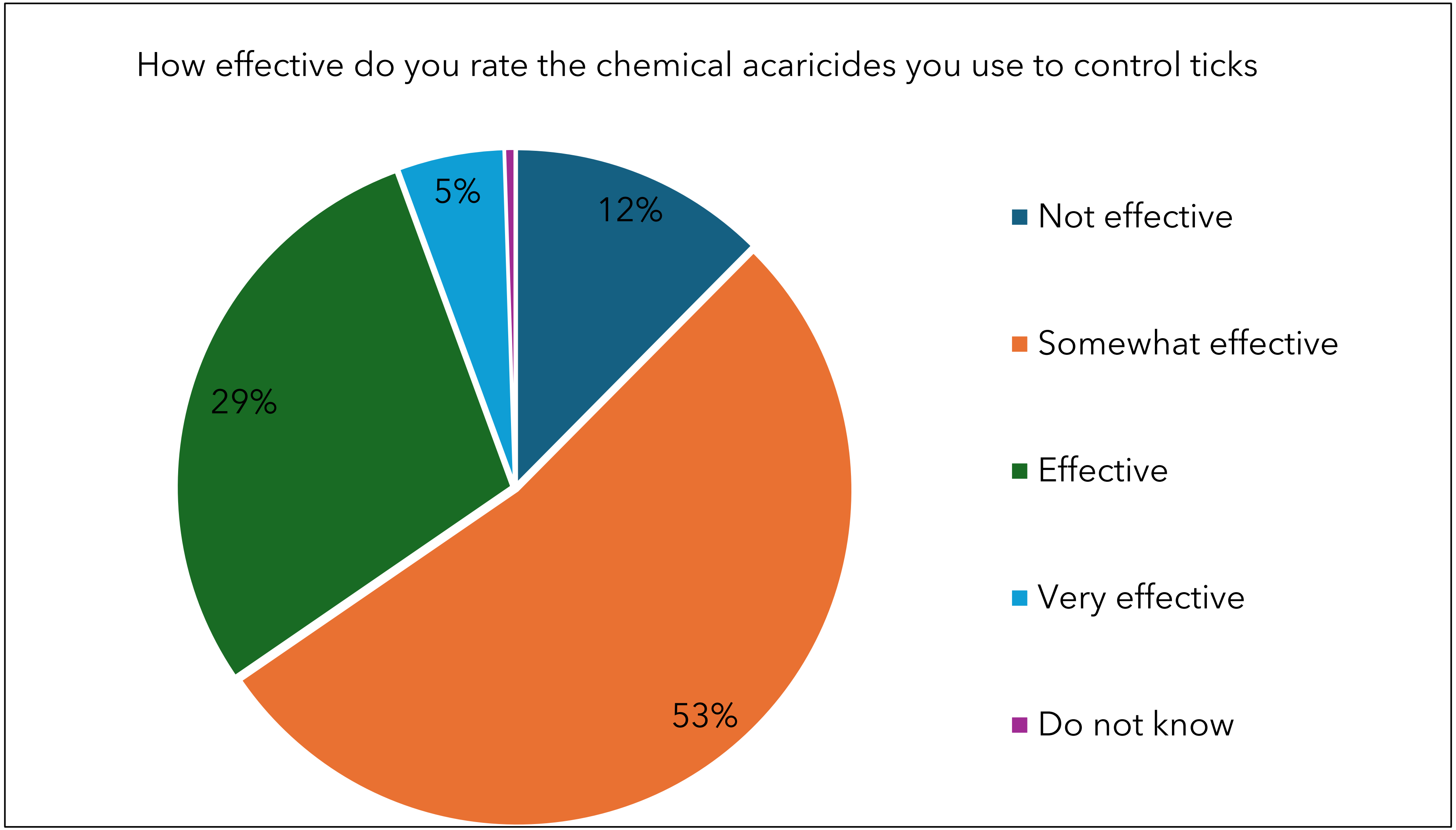
	Mean	SD	Median
Free range grazing in the preceding dry season	0.65		
Rotational grazing in the preceding dry season	0.35		
Free range grazing in the preceding wet season	0.66		
Rotational grazing in the preceding dry season	0.34		
Farmer uses feed supplement	0.65		
Available grazing area in acres	70	61	50
Herd size	68	69	49
Proportion of improved breeds in the total herd	0.93		

Large herds of improved breeds in free-range grazing systems

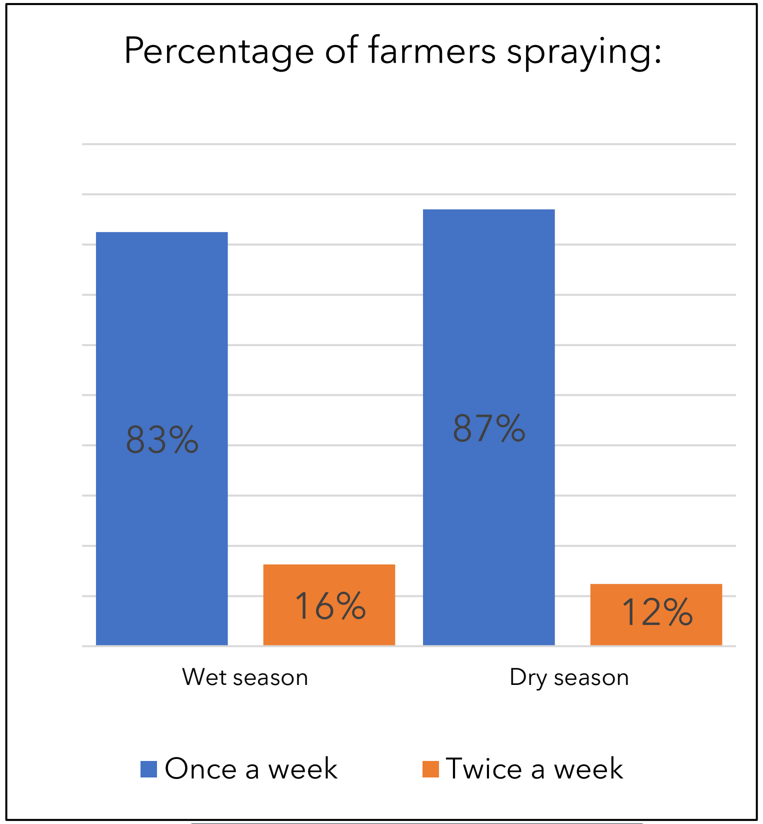
High prevalence of TTBDs & associated costs to farmers

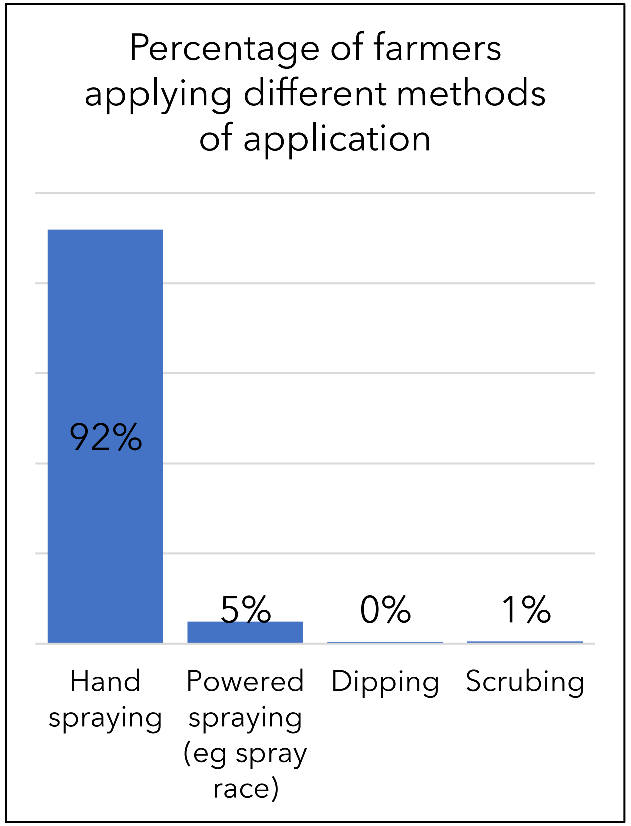
	Mean	SD	Median
Farmer experienced a TBD (ECF is the most common) in the last 12 months	0.76		
Proportion of herd affected by a TBD in the last 12 months	0.24	0.33	0.15
A farmer lost an animal to a TBD	0.52		
Farmer lost 1-9 animals to a TBD	0.39		
Farmer lost more than 9 animals to TBD	0.12		
Number of animals that died from a TBD	3	3	1
Annual costs in UGS spent in TTBDs management (acaricides, treatments)	3,081,367 (USD 832)		
Animal has suffered adverse effects due to acaricide use	0.27		
A person in the family has suffered adverse effects due to acaricide use	0.17		

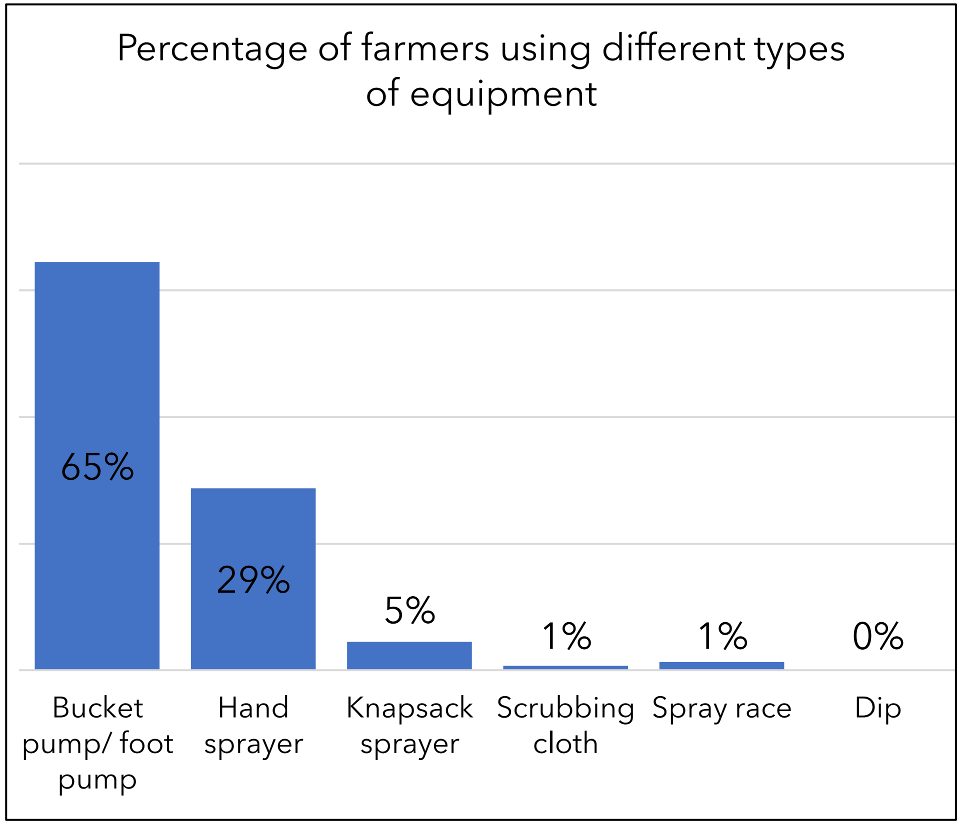
65% of farmers reported their current acaricides as not effective or somewhat effective



Sub-optimal acaricide application procedures







High frequency of treatments

Low use of effective equipment e.g spray race or dips

Improper acaricide rotation practices

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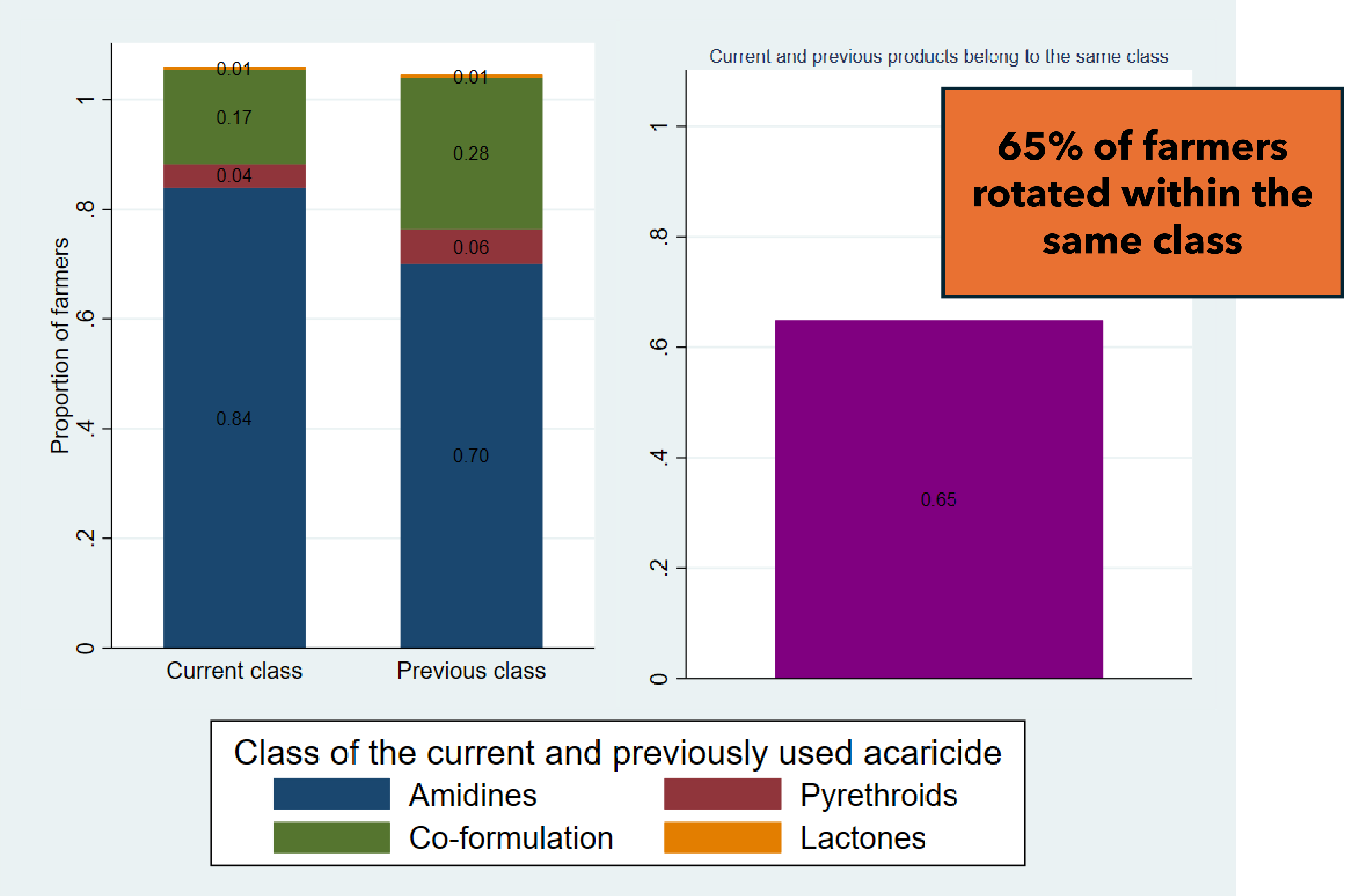
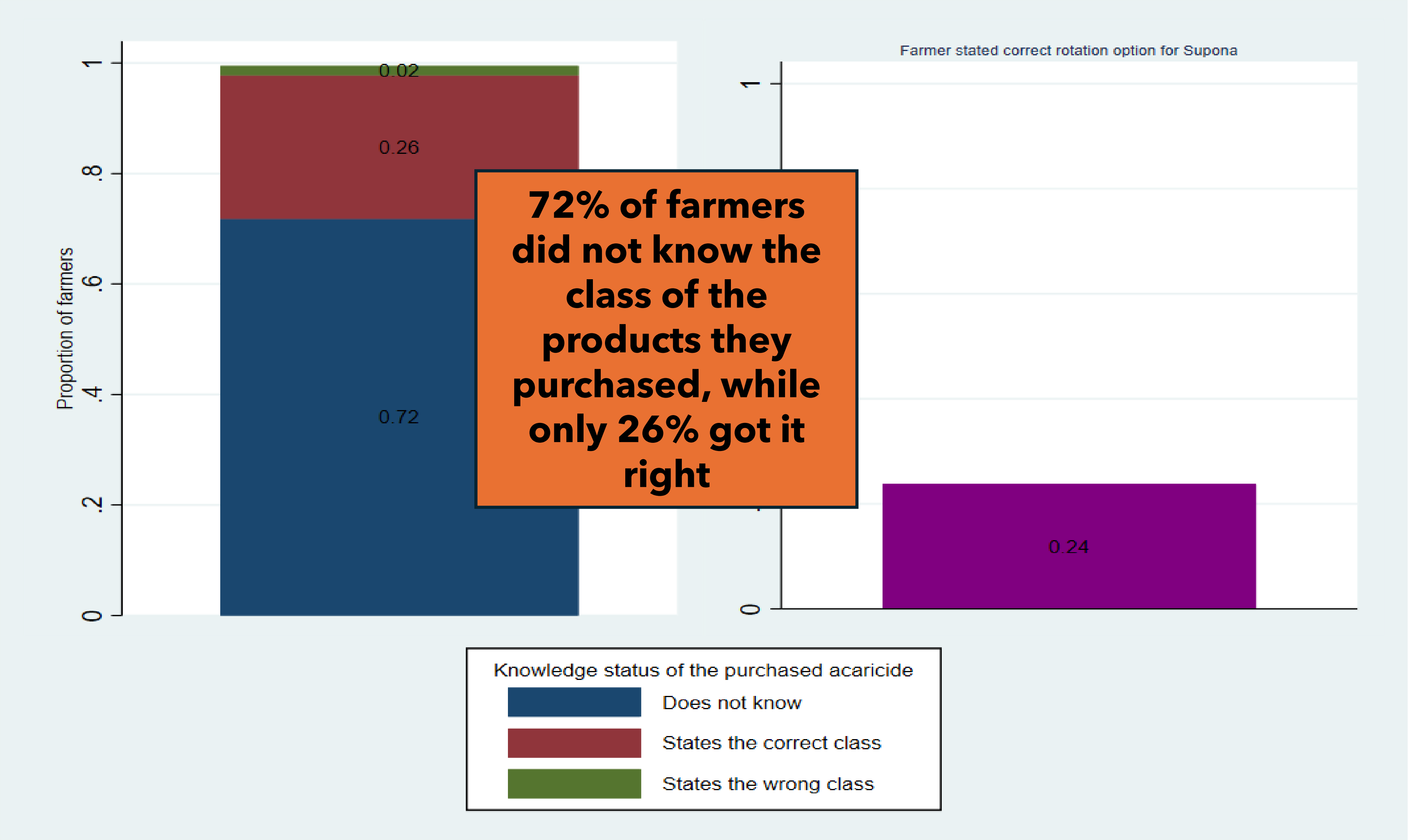
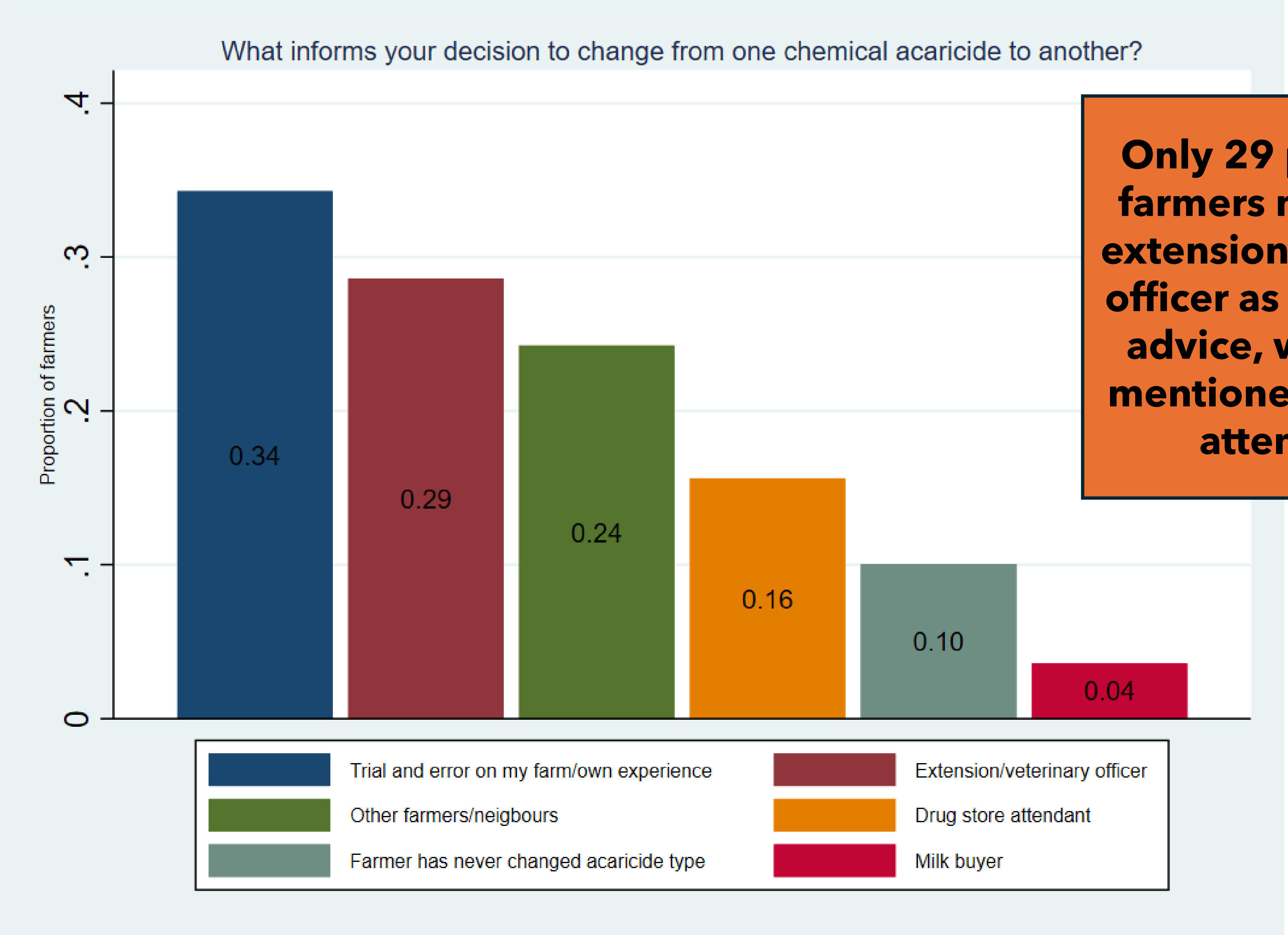


Farmers lack knowledge of different classes of acaricides

Rethinking Food Markets and Value Chains for Inclusion and Sustainability



Farmers are not supported when making decisions on acaricides to use



Only 29 percent of farmers mentioned extension/veterinary officer as a source of advice, while 16% mentioned vet store attendants

Farmers do not interact with some of the existing information materials

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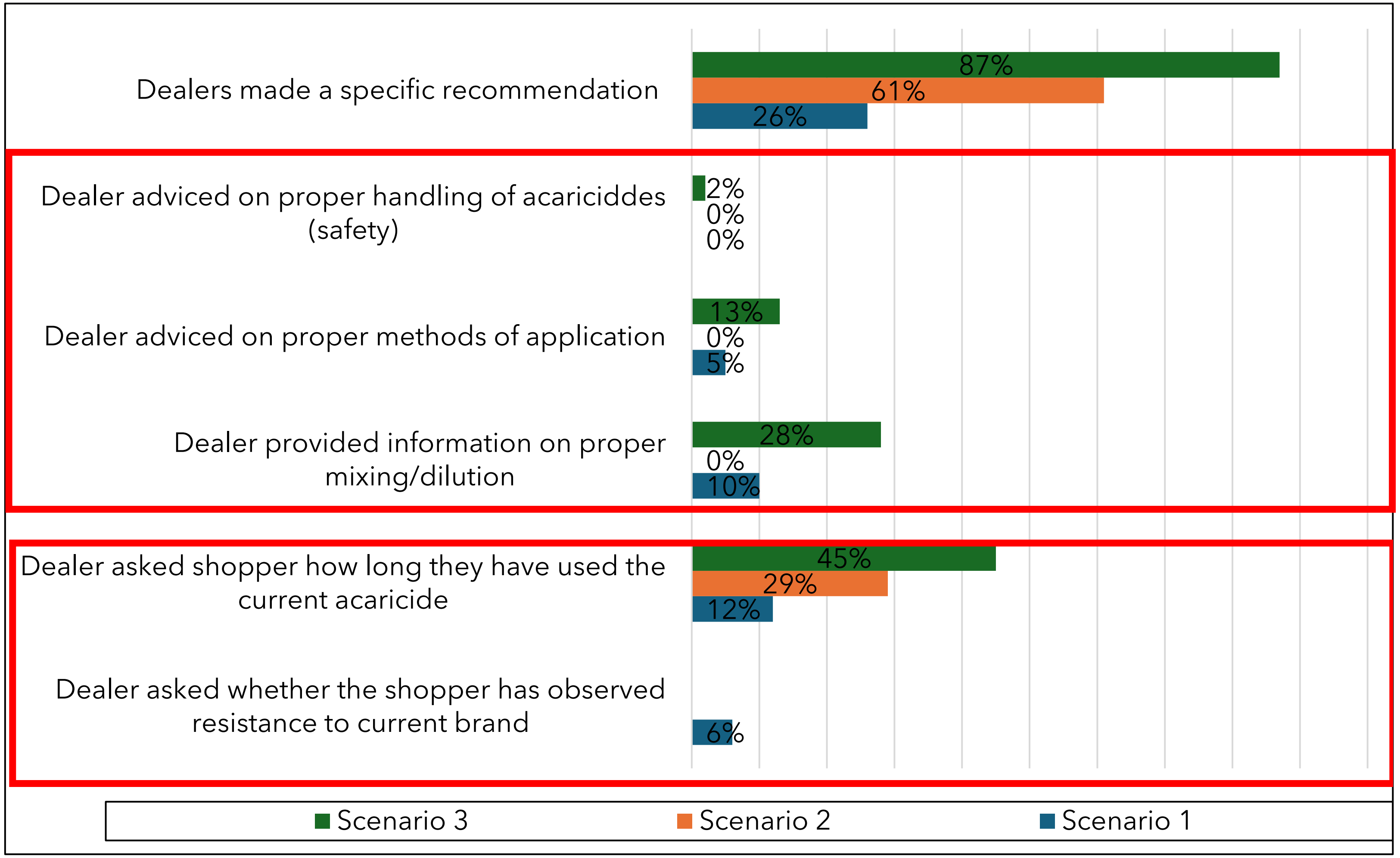
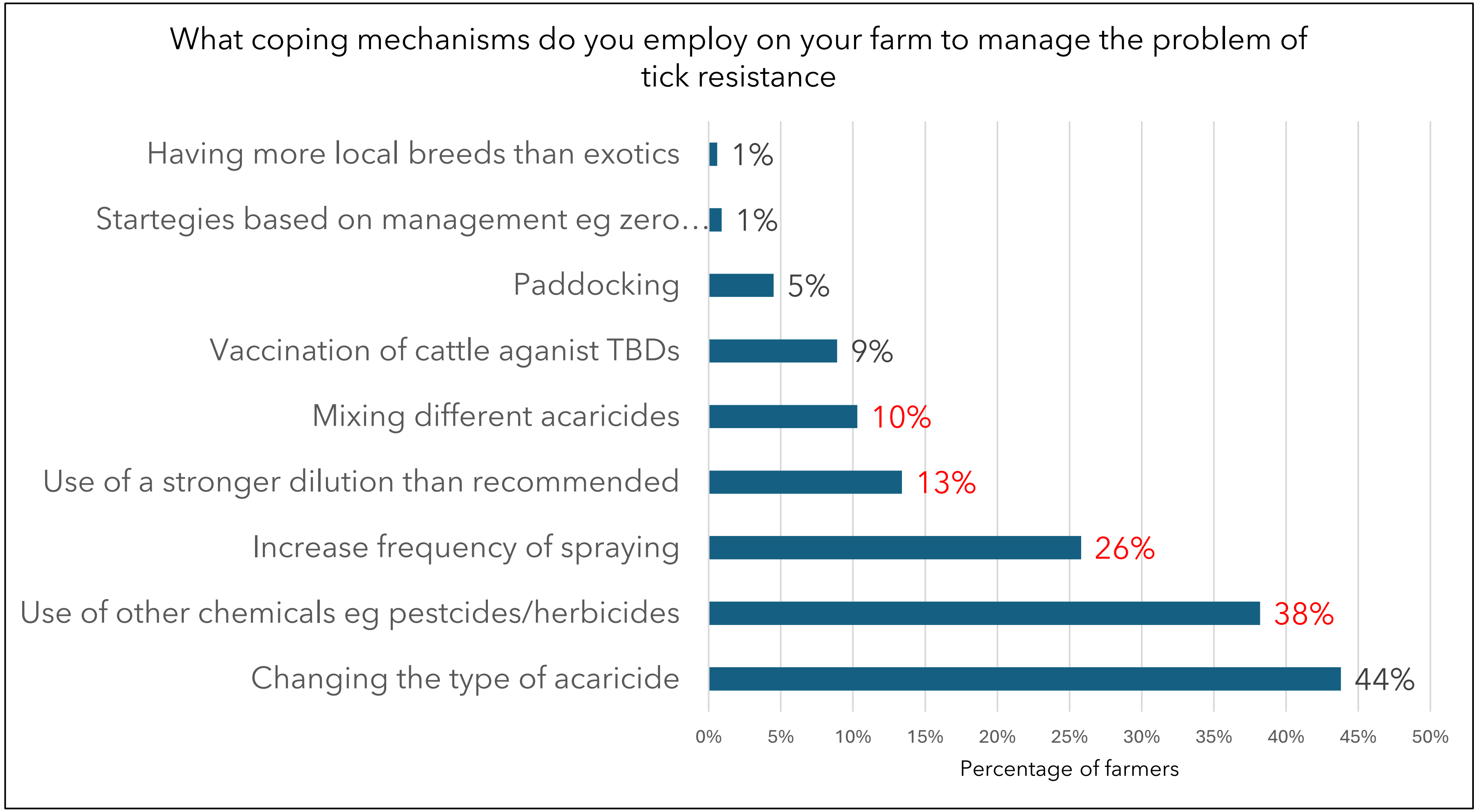
	Percentage of farmers
Farmer has seen the NDA leaflet before	37%
Source of the leaflet	
Drug store	82%
Extension officer	4%
Veterinary Officer	14%
On a billboard	1%
Attention to drug labels	
I do not pay attention to the labels	47%
I only pay little attention to the labels	28%
I pay more attention to the labels	25%

Dealers do not support farmers in their drug choices: results from the mystery shopper's experiment



Scenario 1: Shopper asked for Milibitraz (status quo)
Scenario2: Shopper asked if they could use illicit products
Scenario 3: Shopper complained of resistance to Milibitraz and asked for help

Farmers report using illicit drugs or overuse of acaricides as a coping strategy



Summary and next steps

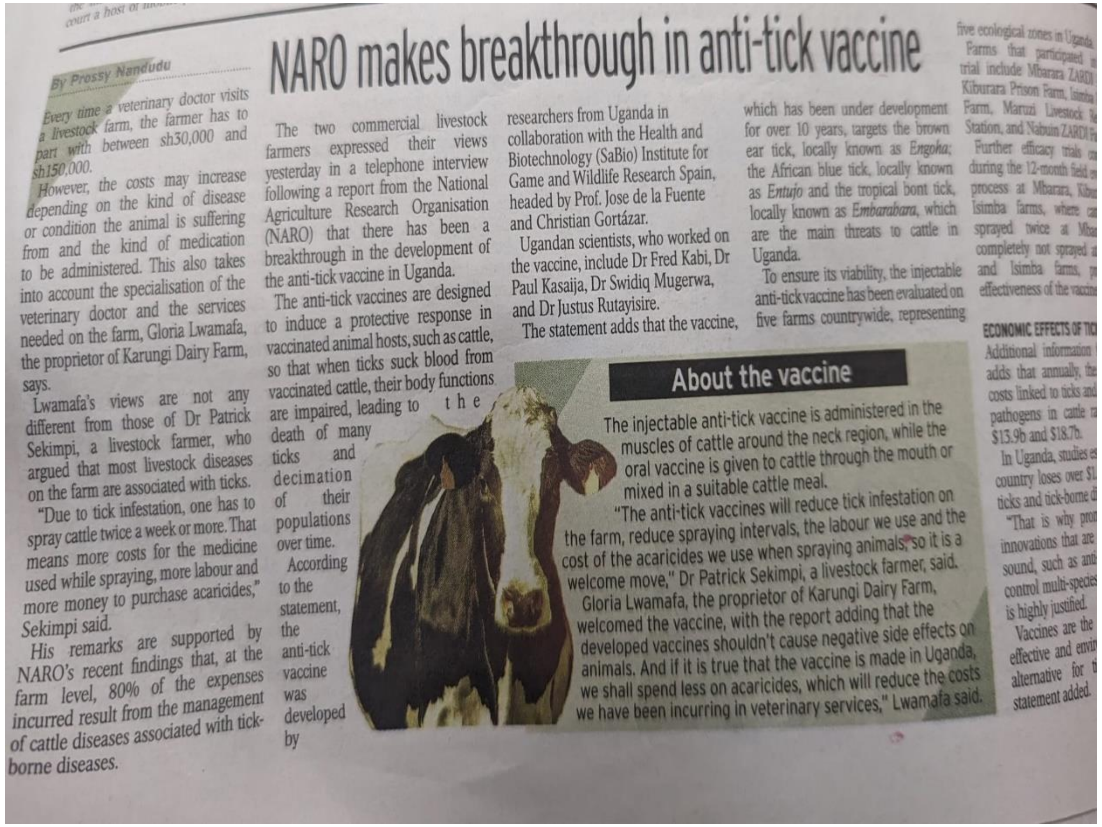
Rethinking Food Markets and Value Chains for Inclusion and Sustainability

- TTBDS and associated failures in chemical control are a major challenge in the dairy value chains
  - Huge costs to farmers
  - Potential implications on the quality of milk, meat, hides
  - Risks to environmental health: modes of application, overuse, use of illicit chemicals

- Further research to quantify the costs/risks to the value chains
  - Prevalence of residuals in milk
  - Quantify the risk associated with the existing residuals

Summary and next steps

- Innovations to address the failures in chemical control
  - Vaccination against ticks
  - Farmer support for proper acaricide usage
    - Training, use of lab-based tests (rapid tests) to guide recommendation
    - Different models of supporting farmers: input supply markets, conventional extension services, digital extension, etc
  - Integrated tick management
    - Pasture management (rotation)
    - Zero grazing?
    - Biological control
  - Policy innovations: government to play a bigger role



NARO makes breakthrough in anti-tick vaccine

By Prossy Nandudu

Every time a veterinary doctor visits a livestock farm, the farmer has to part with between sh30,000 and sh150,000.

However, the costs may increase depending on the kind of disease or condition the animal is suffering from and the kind of medication to be administered. This also takes into account the specialisation of the veterinary doctor and the services needed on the farm, Gloria Lwamafa, the proprietor of Karungi Dairy Farm, says.

Lwamafa's views are not any different from those of Dr Patrick Sekimpi, a livestock farmer, who argued that most livestock diseases on the farm are associated with ticks.

"Due to tick infestation, one has to spray cattle twice a week or more. That means more costs for the medicine used while spraying, more labour and more money to purchase acaricides," Sekimpi said.

His remarks are supported by NARO's recent findings that, at the farm level, 80% of the expenses incurred result from the management of cattle diseases associated with tick-borne diseases.

The two commercial livestock farmers expressed their views yesterday in a telephone interview following a report from the National Agriculture Research Organisation (NARO) that there has been a breakthrough in the development of the anti-tick vaccine in Uganda.

The anti-tick vaccines are designed to induce a protective response in vaccinated animal hosts, such as cattle, so that when ticks suck blood from vaccinated cattle, their body functions are impaired, leading to the death of many ticks and decimation of their populations over time.

According to the statement, the anti-tick vaccine was developed by researchers from Uganda in collaboration with the Health and Biotechnology (SaBio) Institute for Game and Wildlife Research Spain, headed by Prof. Jose de la Fuente and Christian Gortázar.

Ugandan scientists, who worked on the vaccine, include Dr Fred Kabi, Dr Paul Kasaija, Dr Swidiq Mugerwa, and Dr Justus Rutayisire.

The statement adds that the vaccine, which has been under development for over 10 years, targets the brown ear tick, locally known as *Engoha*; the African blue tick, locally known as *Entujo* and the tropical bont tick, locally known as *Embarabara*, which are the main threats to cattle in Uganda.

To ensure its viability, the injectable anti-tick vaccine has been evaluated on five farms countrywide, representing

About the vaccine

The injectable anti-tick vaccine is administered in the muscles of cattle around the neck region, while the oral vaccine is given to cattle through the mouth or mixed in a suitable cattle meal.

"The anti-tick vaccines will reduce tick infestation on the farm, reduce spraying intervals, the labour we use and the cost of the acaricides we use when spraying animals, so it is a welcome move," Dr Patrick Sekimpi, a livestock farmer, said.

Gloria Lwamafa, the proprietor of Karungi Dairy Farm, welcomed the vaccine, with the report adding that the developed vaccines shouldn't cause negative side effects on animals. And if it is true that the vaccine is made in Uganda, we shall spend less on acaricides, which will reduce the costs we have been incurring in veterinary services," Lwamafa said.

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Parallel Session 6

Inclusive agribusiness models and market information

Moderator: Christine Chege, Alliance Bioversity & CIAT

Presentations:

- **Eduardo Maruyama**, IFPRI
- **Kate Ambler**, IFPRI
- **Jeff Bloem**, IFPRI

Discussants:

- **Saweda Liverpool-Tassie**, *MSU (Online)*
- **William Buyungo Luyinda**, *Cofounder & CEO, EzyAgric (Online)*
- **Michael Ogundare**, *CEO Crop2Cash*

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Bundling input and cash loans through digital financial service providers in Nigeria

Kate Ambler, Bedru Balana, Jeffrey Bloem,
Eduardo Maruyama, and Opeyemi Olanrewaju

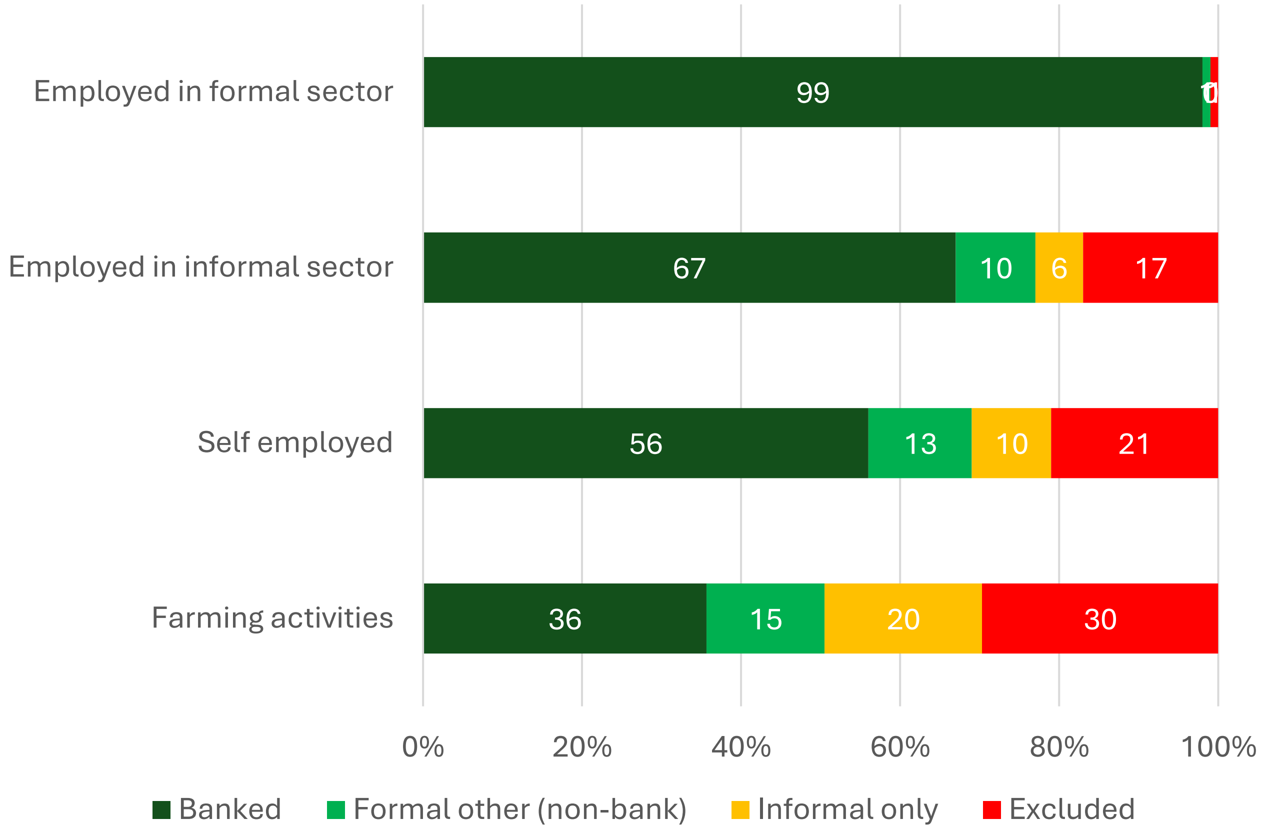
Science, Innovation and Policy Symposium

December 10-11, 2024

Background

- Farmers' lower use of formal financial products and services explained by:
  - Limited banking access in rural areas
  - Seasonal cash flows
  - Lack of traditional collateral for loans
- Preference for informal services reinforced by:
  - Trust within communities
  - Simplicity of processes
  - Participation in community-based groups

Nigeria: Financial products / services used by livelihood (%), 2023

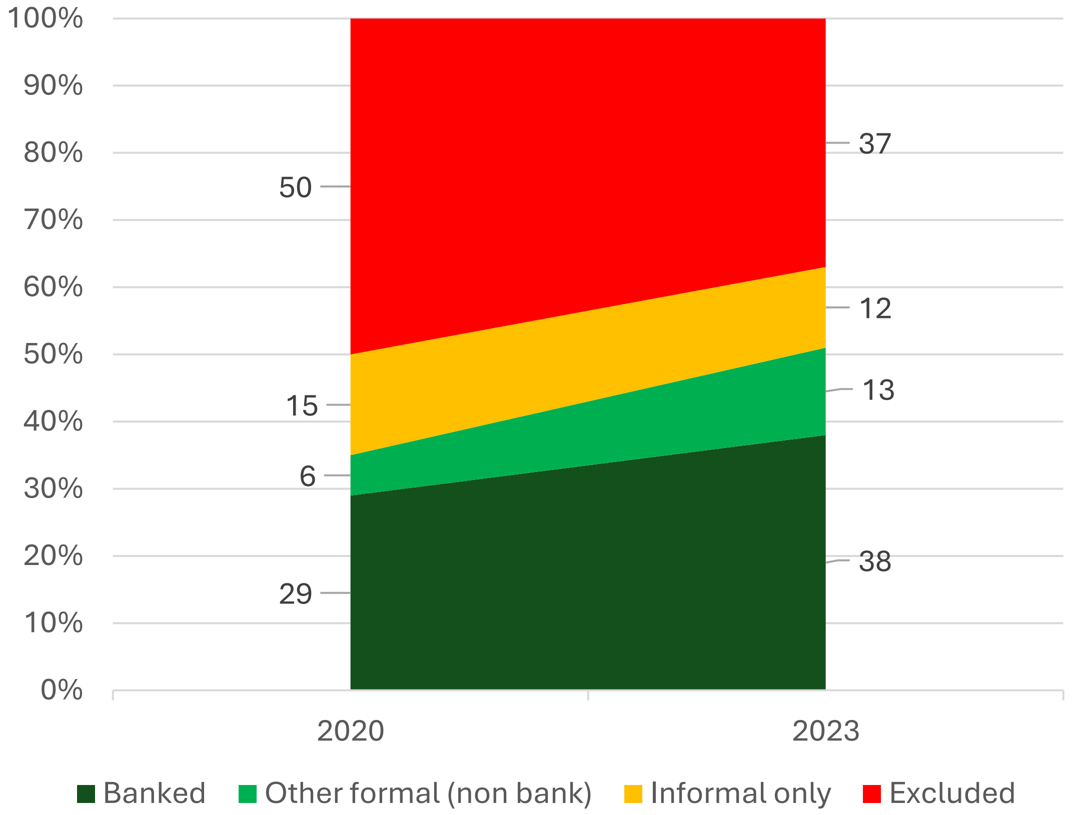


Source: Eromosele, et al. (2023). Access to Financial Services in Nigeria Survey 2023.

Background (II)

- Recent growth in the use of formal financial products and services in rural areas driven by:
  - Increased access to financial service agents
  - Proliferation of mobile banking and digital platforms
  - Growing digitalization of government programs
- But this growth has been driven mostly by mobile payment and cash services (Agri Logic, 2021; Eromosele, et al., 2023).

Nigeria: Financial products / services used in rural areas, 2020 - 2023

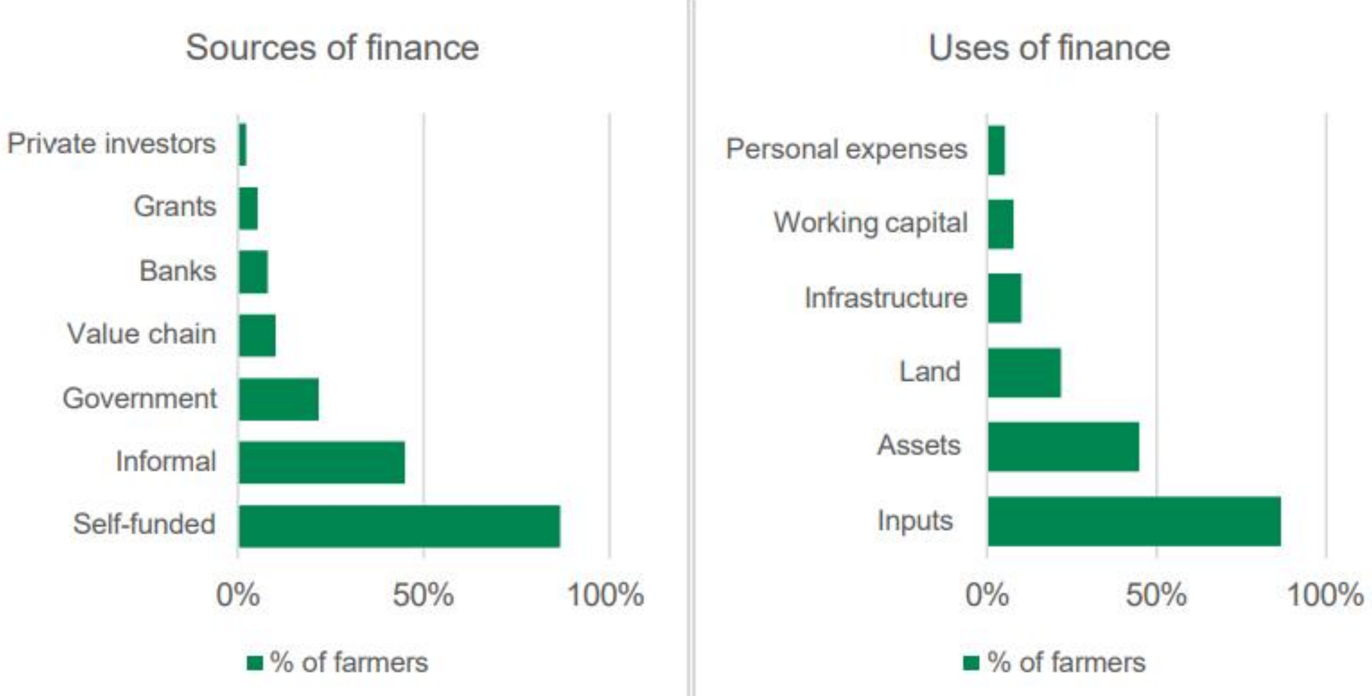


Source: Eromosele, et al. (2023). Access to Financial Services in Nigeria Survey 2023.

Background (III)

- The expansion of digital financial services in rural areas has had little impact on farmers' access to credit.
- Most farmers rely exclusively on their own funds, informal credit, and government support to finance their activities.
- The main use of these funds is to cover the costs of purchasing farm inputs.

Nigeria: Farmers' sources and uses of finance, 2021



Source: Agri Logic (2022).

Our partner: Crop2Cash

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- An agro-tech startup Crop2Cash Ltd was identified as the local partner for this intervention.

- Crop2Cash facilitates easy access to agricultural inputs and services for smallholder farmers in Nigeria through a USSD-based platform that allows farmers to:
    - save money through Crop2Cash agents recruited from input distributors located close to them
    - get paid by buyers through their phone number
    - receive market price updates via SMS
    - build up their financial identity and improve their creditworthiness
    - buy farm inputs on credit

- While all these products are closely linked to each other, the farm inputs on credit specifically stands out as its most popular service.

How does a typical C2C input loan work?

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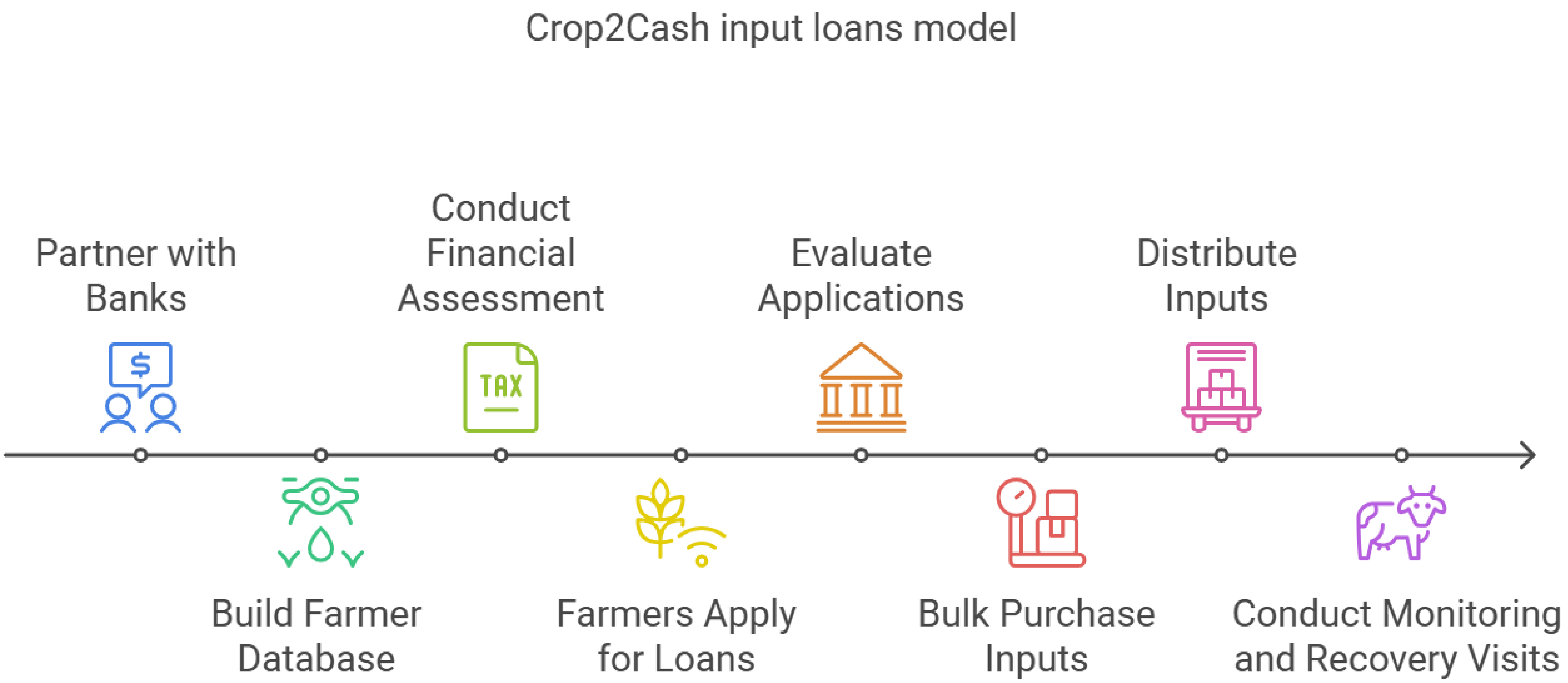

Voices of Crop2Cash Clients

- IFPRI conducted focus group discussions with more than 40 farmers actively engaged in Crop2Cash services in Kebbi State (May 2023).

- Farm inputs on credit was the most popular Crop2Cash service, with 70% of the focus group participants having applied for the input loan, and 40% of them receiving it.

- Generally positive experiences with input loan, but many farmers indicated that a small cash loan would help them meet their other obligations such as labor and equipment costs, which would help them make the most of their input investment.

Research objectives

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- Digital financial service (DFS) providers such as Crop2Cash can help commercial banks reduce the risk and transaction costs associated with providing credit to farmers.

- The objective of our study is to assess whether making Crop2Cash's agricultural loans more fungible can improve loan repayment rates and reduce the overall risk of the banks' input loan portfolio.
    - A secondary objective is to assess whether the increased loan fungibility helps increase farmers' productivity and incomes.

Study context

- Our study, originally intended as a pilot, was conducted during the dry season (November 2023 to April 2024) in 3 LGAs in Kaduna state.
- 286 farmers approved by Crop2Cash to receive a standard input loan were selected to participate in our study. This standard loan had a value of ₦200,000 (~US$250 in November 2023) and consisted of:
  - NPK
  - Urea
  - Herbicides (land clearing, pre-emergence, and post-emergence)
  - Insecticides
  - Insurance
  - Aggregation and extension services

Experimental design

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- The 286 participants were randomly assigned into 3 groups:

  - Treatment group 1: Received C2C standard input loan and a 10% cash loan offer (₦20,000).
  - Treatment group 2: Received C2C standard input loan and a 10% additional input loan offer (worth ₦19,600).
  - Control group: Received C2C standard input loan.

- The additional input loan consisted of land clearing and post-emergence herbicides.
- IFPRI provided a full guarantee fund for the 10% cash and input loans.

Data sources

Administrative data (November 2023 to September 2024)	C2C administrative data with basic information about loan applicants and loan data (loan amount, collateral, interest, payments, loan balance).
Dry season mini-survey (May 2024)	Short survey of study participants (276 responded out of 286) to capture motivations behind loan take-up decisions and views and opinions regarding the input and cash loans.
Main survey (November to December 2024) [currently ongoing]	Full survey of 1,000 dry season farmers in Kaduna (including study participants) to measure household and farm characteristics, agricultural production and marketing outcomes, financial inclusion and access to credit.

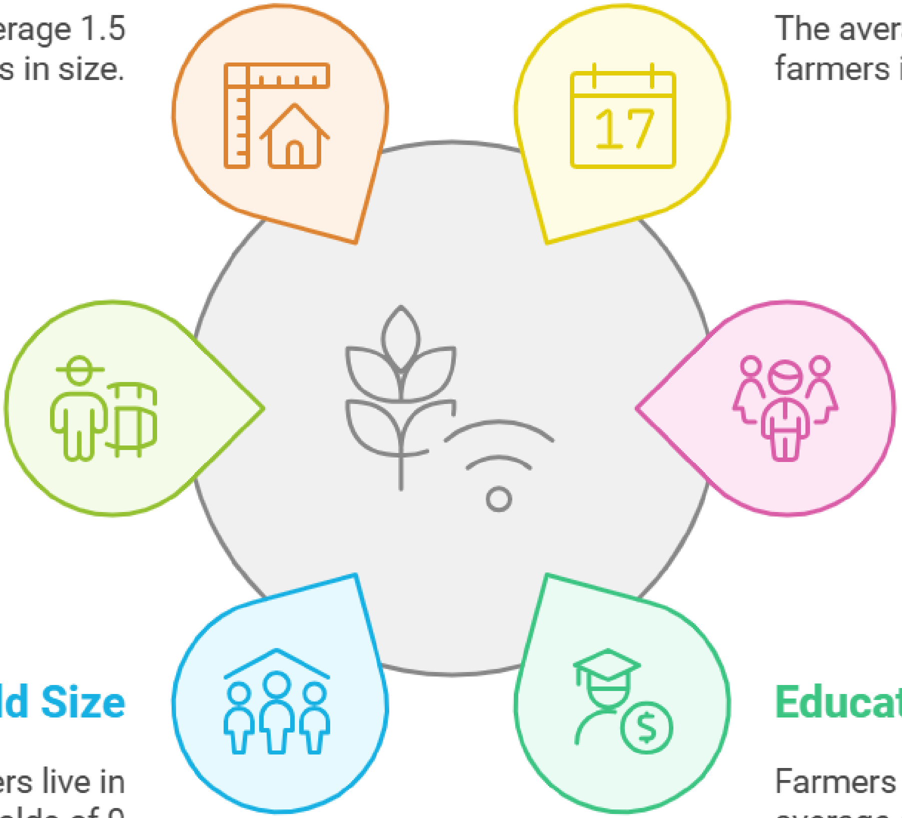
Dry season mini-survey: Summary statistics

Farm Size

Farms average 1.5 hectares in size.

Age

The average age of farmers is 41 years.



Crop Cultivation

All farmers grow maize, and 2 out of 5 grow beans.

Gender Ratio

Less than 2 out of every 10 farmers is female.

Household Size

Farmers live in households of 9 members on average.

Education

Farmers have an average of 9 years of education.

Treatment take-up

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	(1) Full Sample	(2) Female	(3) Male	(4) Education < 7 years	(5) Education > 6 years	(6) Farm size < 1 hectare	(7) Farm size > 1 hectare
T1: Cash loan	0.398***	0.308**	0.412***	0.314***	0.500***	0.333***	0.556***
	(0.051)	(0.134)	(0.055)	(0.066)	(0.078)	(0.0585)	(0.0975)
T2: Input loan	0.604***	0.818***	0.575***	0.511***	0.696***	0.623***	0.567***
	(0.052)	(0.122)	(0.056)	(0.075)	(0.069)	(0.0625)	(0.0923)
T1 = T2 (p-value)	0.005	0.008	0.040	0.049	0.062	0.001	0.934
Observations	276	35	241	152	124	198	78
R-squared	0.282	0.461	0.267	0.233	0.333	0.307	0.256

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Loan recovery

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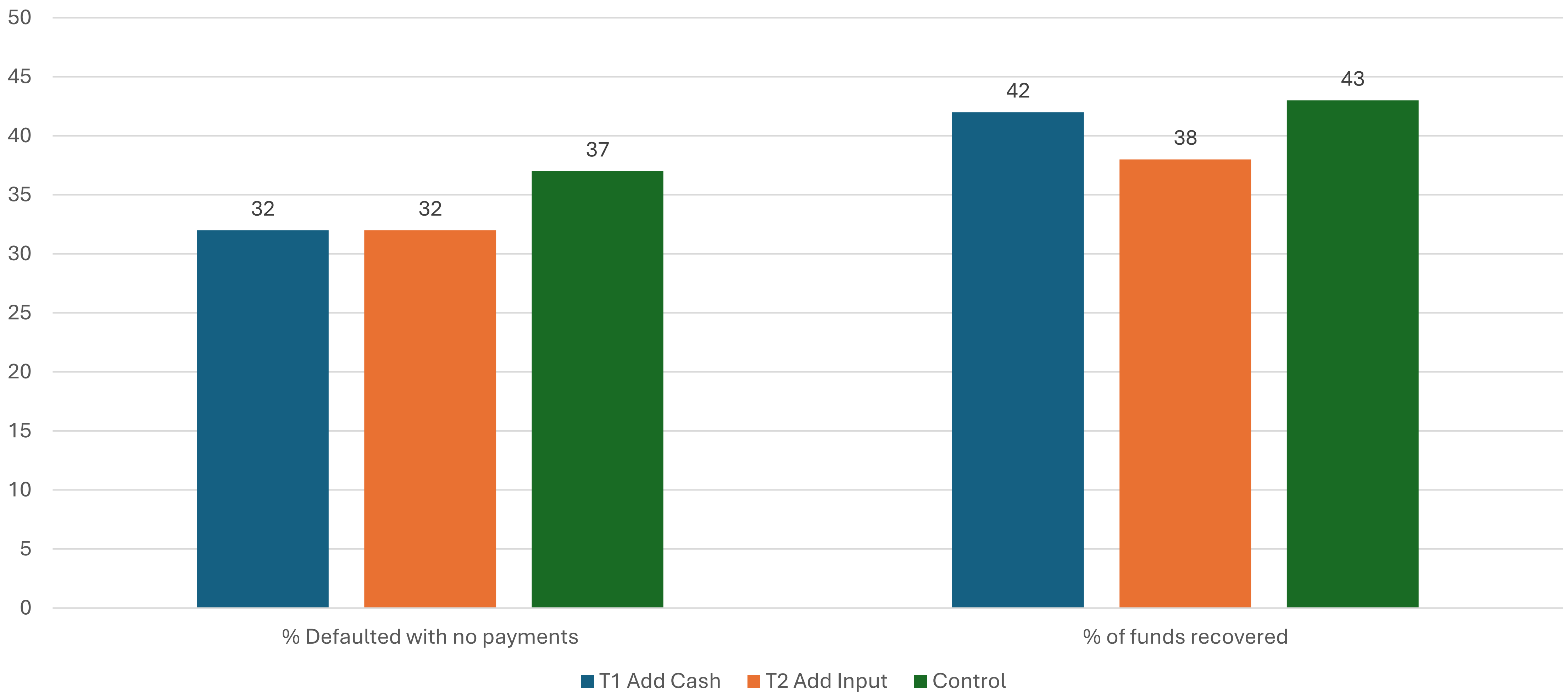

Loan recovery

	(1) Full Repayment	(2) Partial Repayment	(3) No Repayment	(4) Total Repayment	(5) Loan Balance	(6) Recovery Ratio
T1: Cash loan	-0.010	0.066	-0.055	-694.5	8,694	-0.015
	(0.010)	(0.069)	(0.069)	(12,661)	(12,787)	(0.054)
T2: Input loan	-0.010	0.062	-0.052	-8,013	19,715	-0.047
	(0.010)	(0.069)	(0.069)	(12,442)	(12,787)	(0.054)
T1 = T2 (p-value)	N/A	0.961	0.961	0.552	0.388	0.537
Observations	286	286	286	286	286	286
R-squared	0.007	0.004	0.003	0.002	0.008	0.003

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Final remarks

1. While many farmers stated interest in an additional cash loan both in focus group discussions before the intervention, and in the mini-survey conducted immediately after, the take-up rate of the additional cash loan was lower than the take-up rate of the additional input loan. However, it is worth noting that a 40 percent take-up rate for the additional cash loan does suggest that there is meaningful demand for cash loans.

2. One sub-group of farmers in our sample where we do observe similar take-up rates of the additional cash loan and the additional input loan is farmers with more than one hectare of cultivated land. This motivates further investigation into heterogeneity by farm size and other factors that could influence demand for cash loans.

3. Compared to typical seasons where between around 90 percent of farmers repay the loan to Crop2Cash in full, the repayment rates in our study were extremely poor. A combination of factors—such as high rates of inflation and a volatile agricultural input pricing environment—likely contributed to these low loan repayment rates but further research is needed to understand this outcome.

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Micro-equity contracts for livestock in Bangladesh

Kate Ambler, Mehrab Bakhtiar, Alan de Brauw, Riad Uddin

Agricultural finance in Bangladesh

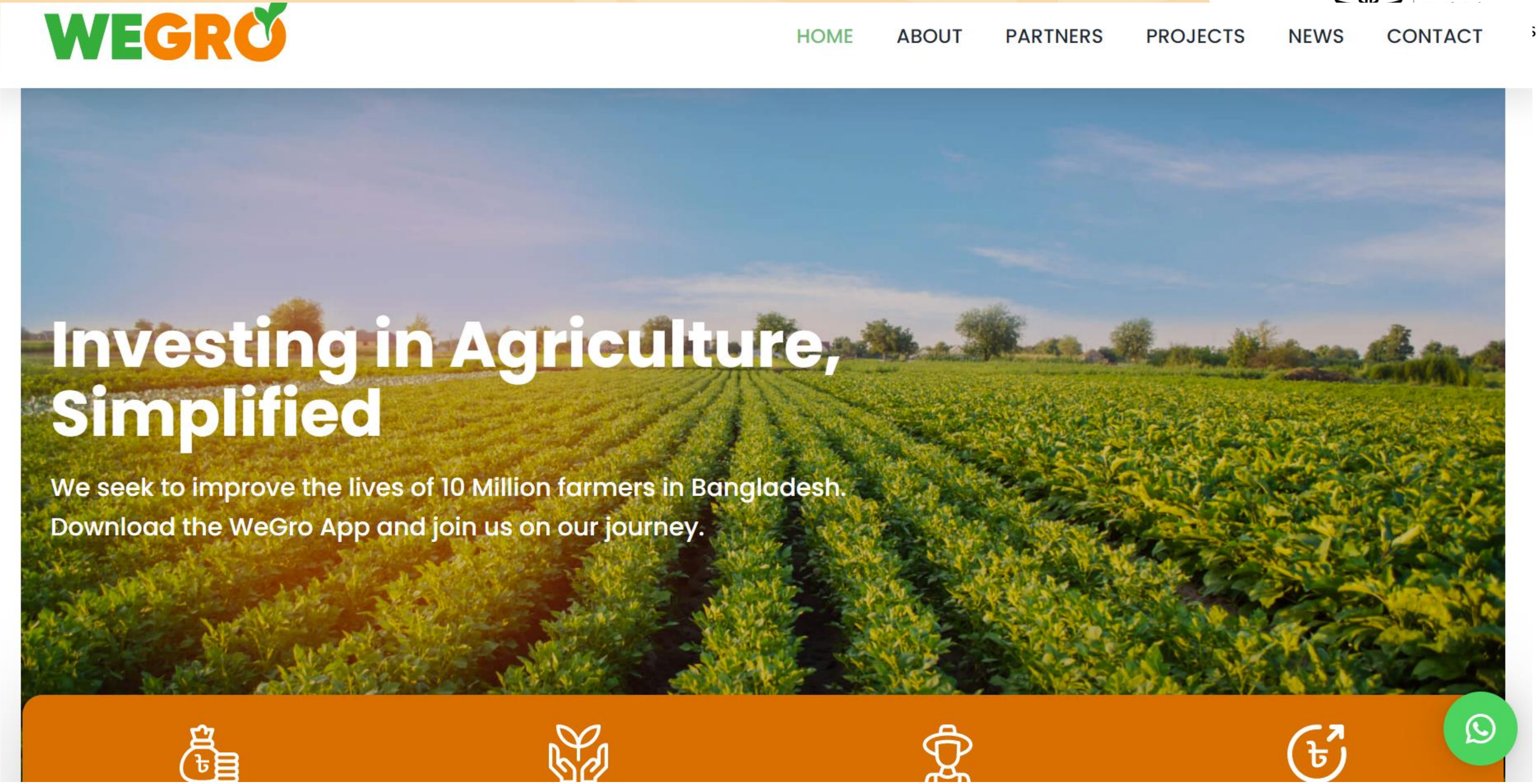
- Smallholders have limited access to finance, and struggle to access credit from banks and other financial institutions
- Microfinance was an innovation in this space, expanding access, but can be expensive and inflexible
- The private sector has been developing new models that seek to harness new technology and financing mechanisms to improve on the microfinance model

Study motivation

- Access to low-cost/flexible financing options
  - Cattle farmers in Bangladesh don’t have easy access to credit
  - Existing credit facilities from NGOs are also costly
  - Due to the high operating costs in rural locations, banks are unwilling to provide loans to farmers.
- Access to market/logistics
  - Farmers often do not receive a fair price for their final product in the local market.
- Quality inputs
  - Quality inputs are mostly expensive and may not be easily accessible.
  - Although local input producers may offer lower-priced inputs, may not be high quality

Profit sharing and asset-based financing

- Company purchases cow, farmer takes care of cow
- Cow is sold 4 - 5 months later, “profit” split between farmer and company
- Cow is insured against death
- **Profit sharing:** Spreads risk between farmer and financier
- **Asset-based financing:** Reduces risks for financier
- Design rooted in traditional product present in context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Long Term Project

Company received financing from:

- Peer to peer financing
- Venture capital
- Bank financing

Cattle Trade-6

৳ 50,000 /Unit

Sonali Chicken – 2

৳ 20,000 /Unit

Project design

Control villages: No WeGro activities

Profit-sharing villages:

- WeGro offered profit-sharing contract to eligible households
- WeGro assists with purchase of cow, preferably preferred breed
- WeGro supervises sale of cow
- Farmer payout is 2/3 of sale price – buying price

Loan villages:

- WeGro offered a standard loan contract to eligible households
- WeGro assists with purchase of cow, preferably preferred breed
- WeGro supervises sale of cow
- Farmer pays WeGro back the purchase price plus 10% interest


WEGRO


WEGRO

Sampling strategy

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- Villages selected from list shared with research team by WeGro
  - 105 villages in Joypurhat, Bogura, Rangpur, and Gaibandha districts in northwest Bangladesh
- Research team conducted listing survey to determine household eligibility
  - Adequate facilities to shelter cow, prior experience
  - Interest and willingness to engage in study
- From eligible households, random selection of 10 households per village for baseline: 1,517 household
- Village level randomization following baseline
  - Created “blocks” of 7 villages
  - 3 control, 3 profit sharing, 1 loan
- Household level randomization
  - Women perform most labor for cattle fattening but no market access
  - Random assignment at household level of contract offer to male or female
- Treatment offers made following baseline and randomization

Sample description

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	Mean
Average per capita weekly food expenditure	509 taka (4.25 USD)
Female education	7.8 years
Male education	7.8 years
Female daily hours on livestock rearing	2.5 hours
Male daily hours on livestock rearing	1.7 hours
Female daily work hours	5.6 hours
Male daily work hours	10.6 hours

Operational challenges

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- Farmer concerns: Terms of financing, timing, fears of theft, eligibility concerns, health concerns, financial concerns
- Livestock health issues: Spread of Lumpy Skin Disease
- Natural disasters: Heavy rainfall and floods affected supply chain and farmer capacity
- Political instability: Demonstrations/strikes around elections in December 2023, demonstrations leading to change in government in August 2024
- Funding challenges: Decline in peer-to-peer funding
- Operational challenges: New fintech company learning on the ground

Implementation data

	N	Overall	Profit Sharing	Loan	Female Offer	Male Offer
				Mean		
Ever accepted the offer	864	0.372	0.396	0.297	0.369	0.374
Ever received cow if accepted offer	321	0.642	0.624	0.714	0.642	0.642
Ever did not receive cow if accepted offer	321	0.555	0.581	0.444	0.591	0.519
Ever received cow in both cycles	864	0.046	0.043	0.057	0.056	0.037
Cow buying price (taka)	246	80,059	79,383	82,299	79,500	80,645
Cow buying weight (kg)	246	214	212	220	215	213
Cow selling price (taka)	234	96,340	95,797	98,150	97,809	94,741
Cow selling weight (kg)	227	254	253	258	252	256
Price difference (taka)	234	15,941	15,850	16,242	18,454	13,203
Weight difference (kg)	227	38	38	39	36	40

Midline data

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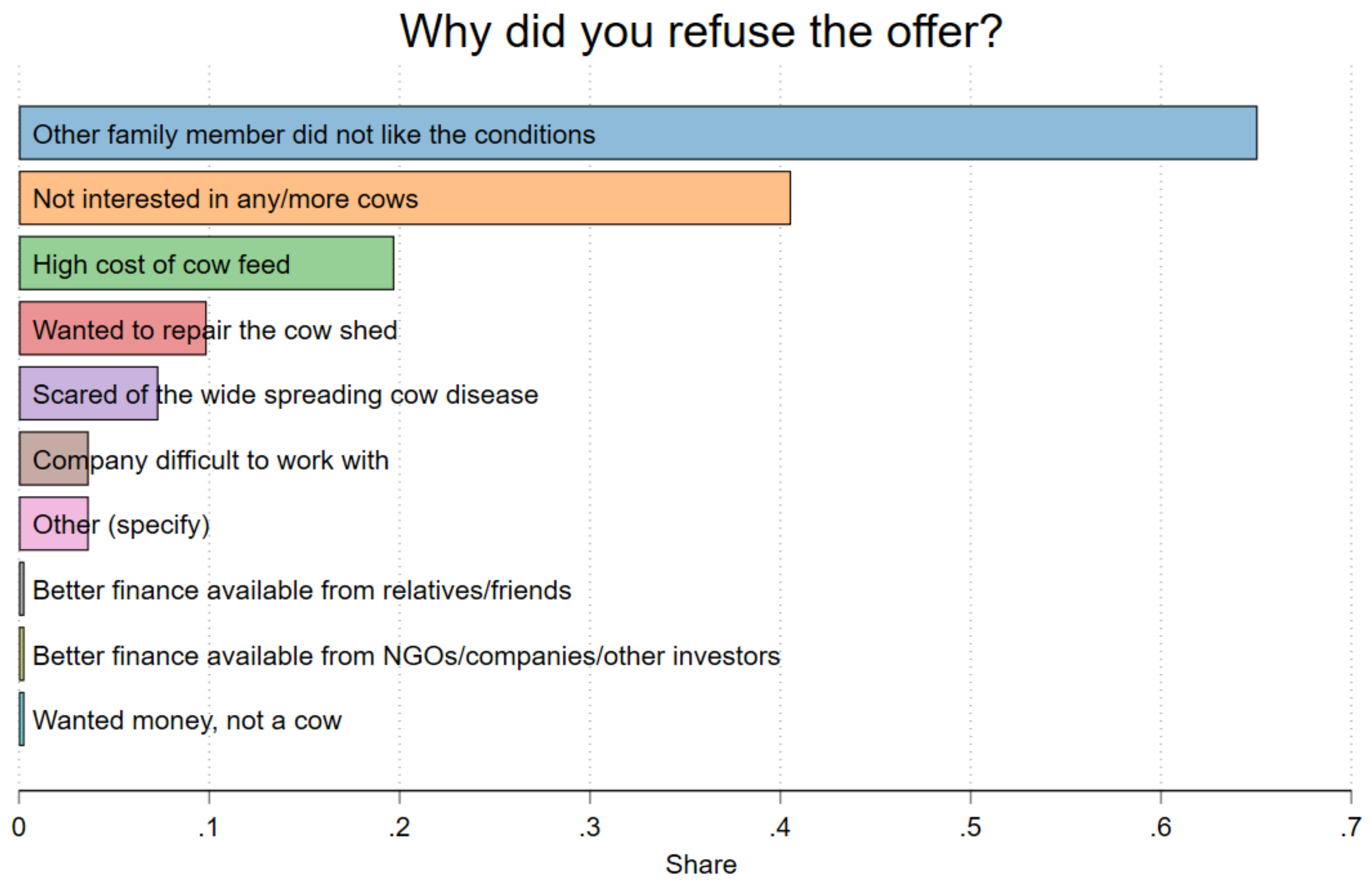
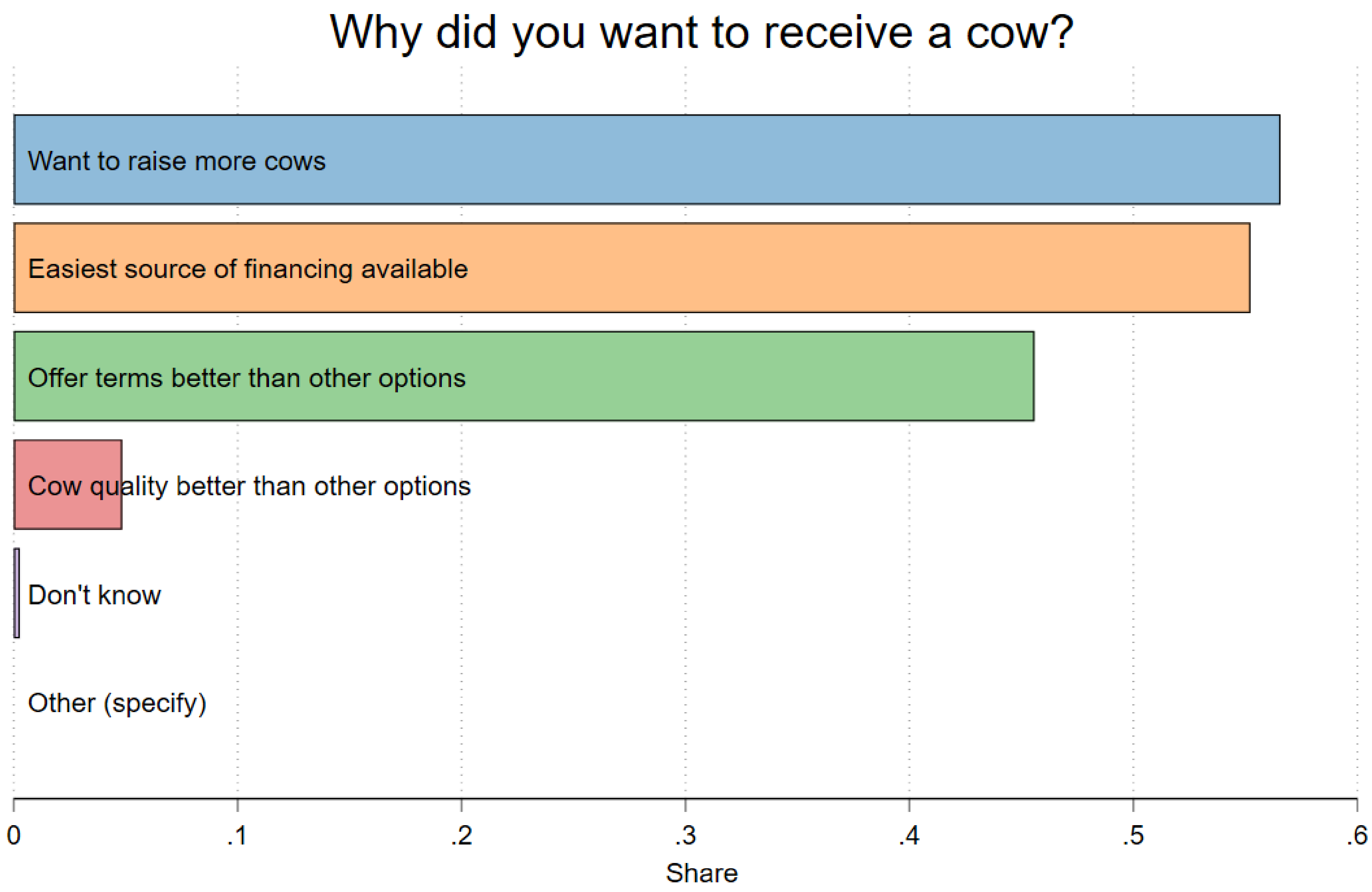
	N	Overall	Profit Sharing	Loan	Female Offer	Male Offer
		Mean				
Received visit	811	0.959	0.957	0.965	0.958	0.960
Offered contract	778	0.986	0.988	0.979	0.987	0.984
Accepted offer	767	0.537	0.548	0.503	0.556	0.518
Received a cow	811	0.243	0.252	0.215	0.244	0.241
Received a cow if offered & accepted contract	412	0.478	0.486	0.453	0.465	0.492

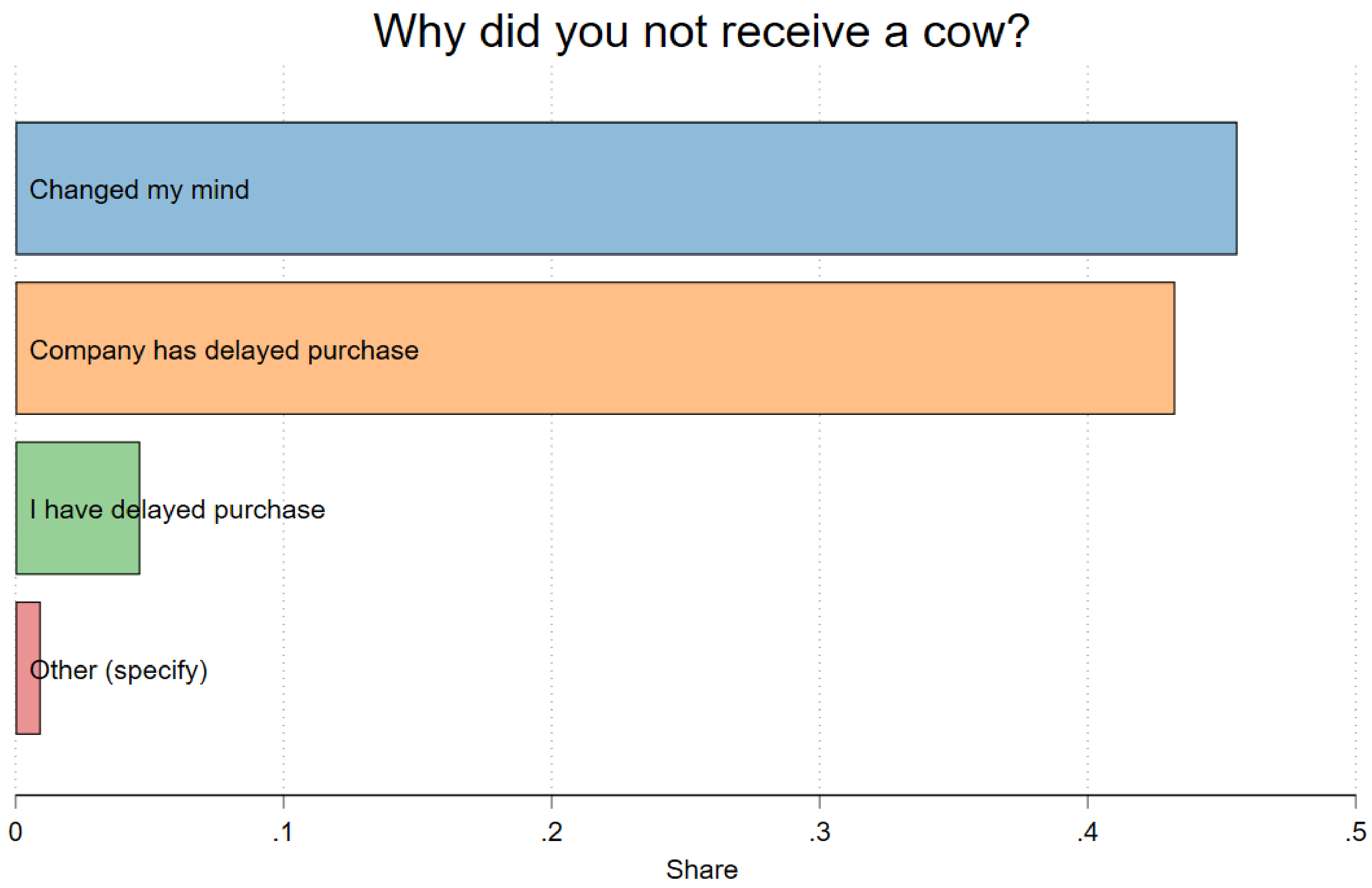
Midline data



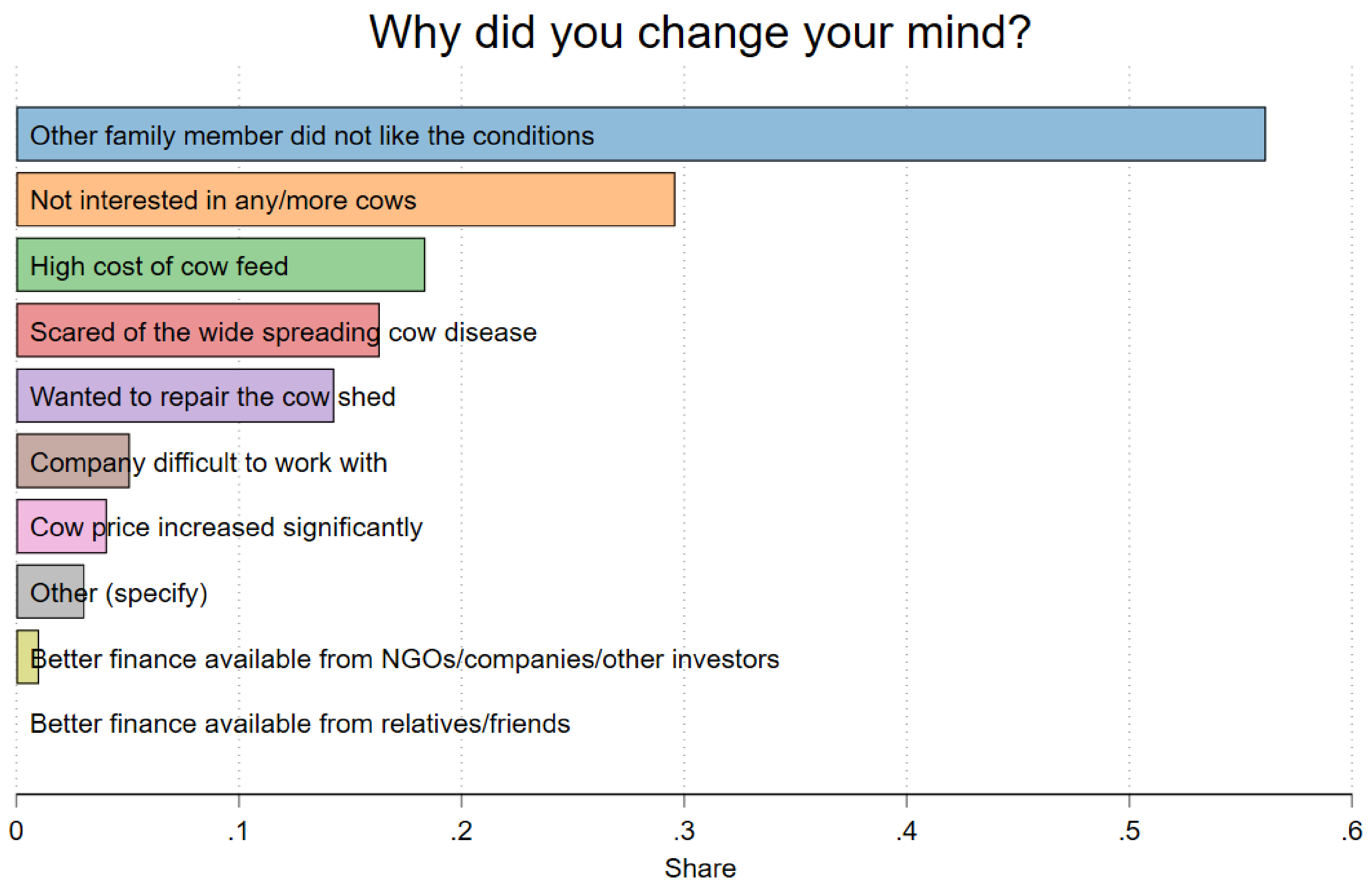
Midline data



Midline data



Midline data



Midline data

	Overall	Profit Sharing	Loan	Female Offer	Male Offer
	Mean				
# of cows owned today	1.989	1.897	2.214	1.897	2.052
# of cows owned since baseline (no longer owned)	0.465	0.495	0.561	0.528	0.494
Total # of cows owned since baseline (past + current)	2.454	2.393	2.776	2.425	2.546
# of cows financed through: Profit sharing from WeGro	0.181	0.384	0.112	0.330	0.300
# of cows financed through: Profit sharing from local investor	0.106	0.079	0.147	0.088	0.105
# of cows financed through: Loan from WeGro	0.043	0.007	0.259	0.060	0.083
# of cows financed through: Loan from NGO	0.113	0.072	0.056	0.042	0.094
# of cows financed through: Bank loan	0.008	0.005	0.021	0.000	0.018
# of cows financed through: Loan from other source	0.009	0.005	0.000	0.004	0.004
# of cows financed through: Self financing	1.388	1.320	1.350	1.326	1.329
# of cows financed through: Interest-free loan	0.015	0.010	0.028	0.011	0.018
# of cows born or received as gift	1.374	1.281	1.486	1.302	1.362

The Unmet Financial Needs of Intermediary Firms within Agri-food Value Chains in Uganda and Bangladesh

December 10, 2024

Annet Adong
Kate Ambler
Jeffrey Bloem
Alan de Brauw
Sylvan Herskowitz
AHM Saiful Islam
Julia Wagner

Agri-Food Value Chains and the "Hidden Middle"

- Farmers/producers and consumers have been studied from many perspectives for many years
- Yet, the activities and needs of "intermediary" firms remain understudied
  - **Bellemare, Bloem, and Lim (2022)** highlight how graduate school classes start with consumer theory and producer theory, with producers and consumers interacting directly with each other.
  - "… most theories of agricultural development, structural transformation, and economic development abstract away from the important roles of agri-food value chains." **(Barrett, Reardon, Swinnen, and Zilberman 2022)**
  - **Reardon (2015)** calls the intermediary segments of agri-food value chains the "hidden middle" because they are mostly neglected from mainstream academic literature and policy debates.
  - **Reardon and Timmer (2007)** make a similar case for the study of agribusinesses in development economics.

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Data Collection and Sampling Approach

- **Goal**: To systematically survey "intermediary" actors across agri-food value chains

- **Challenge**: Agricultural value chains take the form of a network, with actors at various stages linked together through a series of transactions
  - Difficult to use traditional sampling
    - Actors tend to be informal and mobile
    - Limited knowledge of value chain structure to generate a sampling frame

- **Respondent-driven sampling**: We draw on methods developed by sociologists to survey network-based populations
  - Allows respondents to inform the path of the interview process.
  - Allows researchers to calculate sampling weights to estimate population parameters

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Sample Composition and Demographic Statistics

- Uganda
  - Arabica coffee
    - 1,400 traders
    - 111 processors
    - 334 wholesalers
  - Soybean
    - 507 traders
    - 0 processors
    - 280 wholesalers
- Bangladesh
  - Rice
    - 1,066 traders
    - 456 processors
    - 220 wholesalers
  - Potato
    - 1,117 traders
    - 0 processors
    - 235 wholesalers

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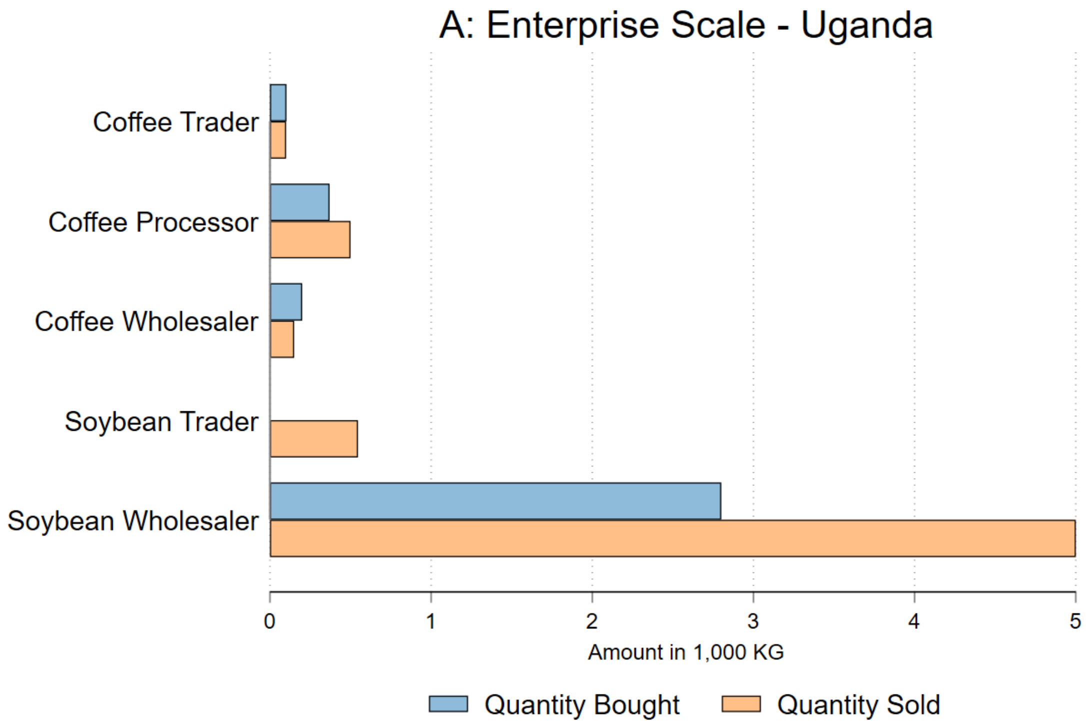
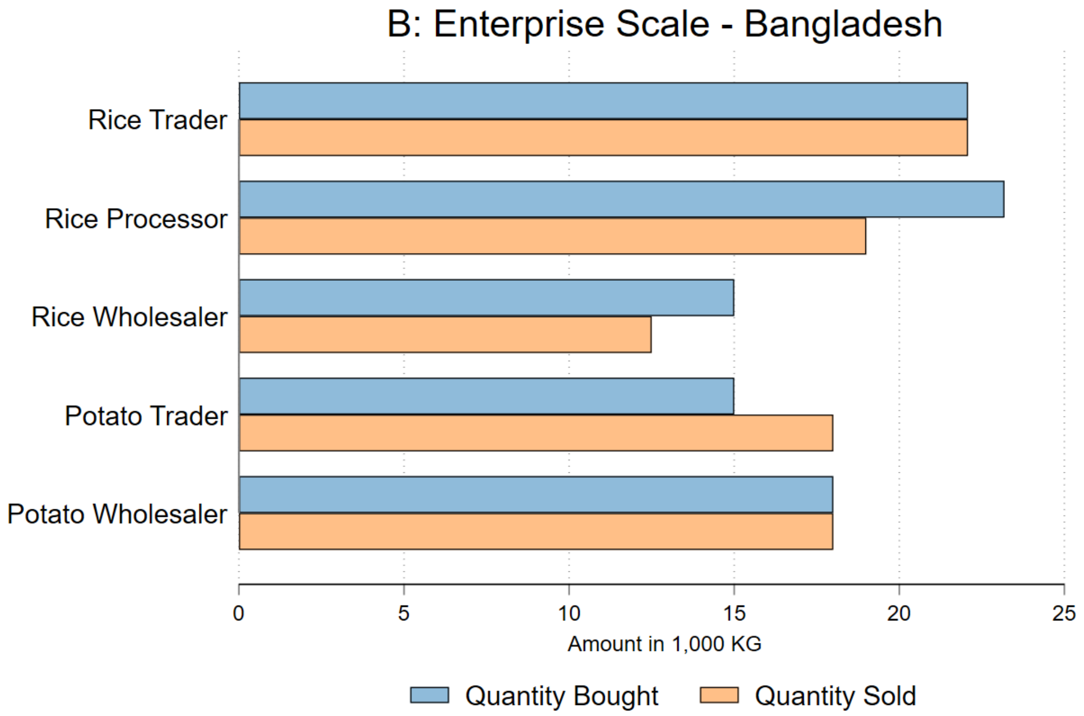
Enterprise Scale
Uganda and Bangladesh





Five Stylized Facts

Fact 1:

Gender and age gaps in employment persist in agri-food value chains

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Employment Gaps within Intermediary Firms
Uganda and Bangladesh

Country	Commodity	Value Chain Segment	1	2	3	4	5		6		7	
			Obs.	Share male	Age	Employ others	Number of full-time employees		Number of part-time employees		Number of seasonal employees	
							Men	Women	Men	Women	Men	Women
Bangladesh	Rice	Traders	1,066	0.99	44	0.04	0.04	0.00	1.63	0.03	8.63	0.20
		Processors	456	1.00	46	0.18	0.30	0.12	3.86	1.57	8.92	2.22
		Wholesalers	220	0.99	46	0.03	0.05	0.00	0.91	0.04	6.64	0.04
	Potato	Traders	1,117	0.99	44	0.04	0.06	0.00	2.83	0.77	12.67	4.87
		Wholesalers	235	0.99	44	0.08	0.27	0.00	2.15	1.04	8.94	4.58
Uganda	Arabica coffee	Traders	1,401	0.84	40	0.35	0.27	0.15	0.75	0.31	1.22	0.64
		Processors	111	0.90	39	0.59	1.79	1.31	1.63	1.03	4.07	4.41
		Wholesalers	334	0.94	42	0.40	0.64	0.24	0.90	0.31	1.59	1.41
	Soybean	Traders	507	0.91	38	0.44	1.51	0.17	1.80	0.17	1.30	0.28
		Wholesalers	280	0.80	39	0.71	3.37	0.48	2.30	0.43	3.07	0.66

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Fact 2:
Enterprise transactions are overwhelmingly conducted with cash

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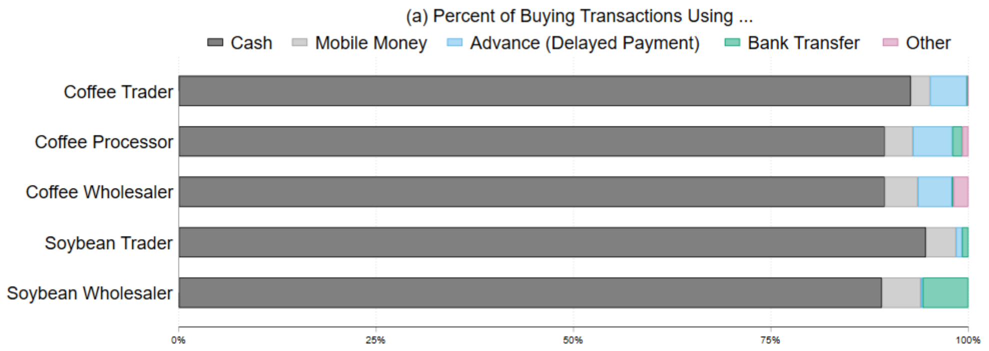
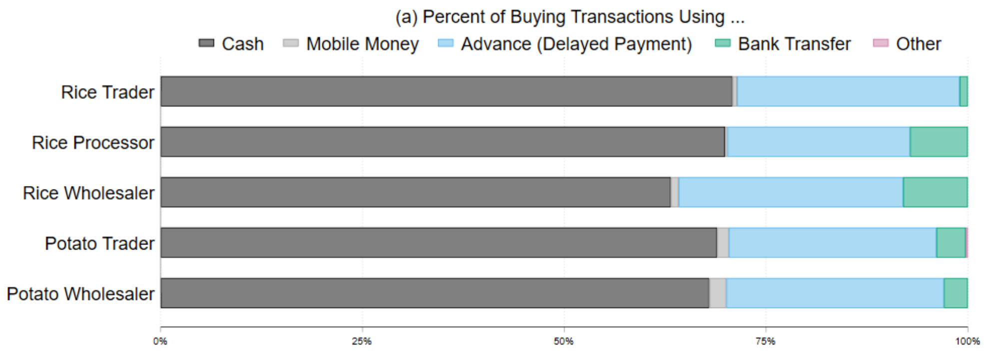
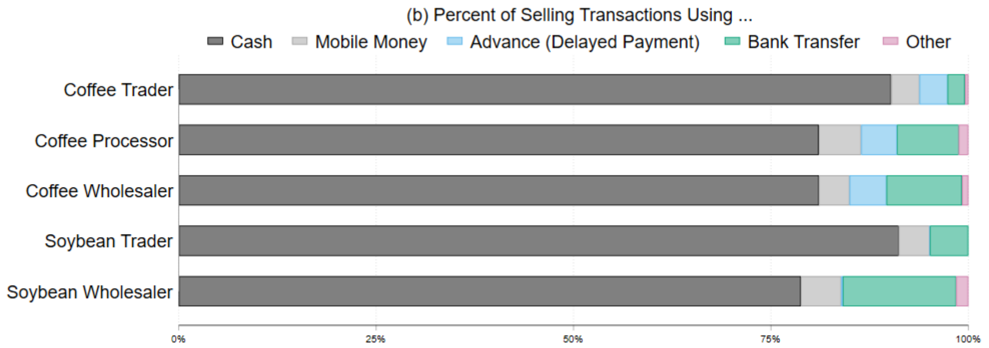
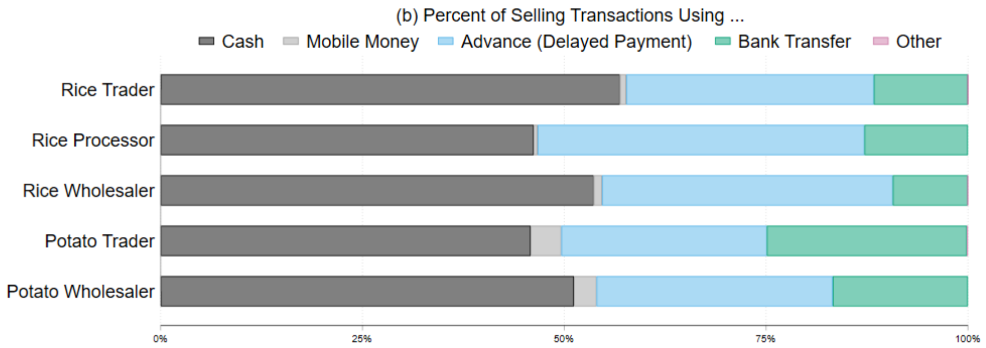
Enterprise Transactions overwhelmingly use cash

Uganda and Bangladesh





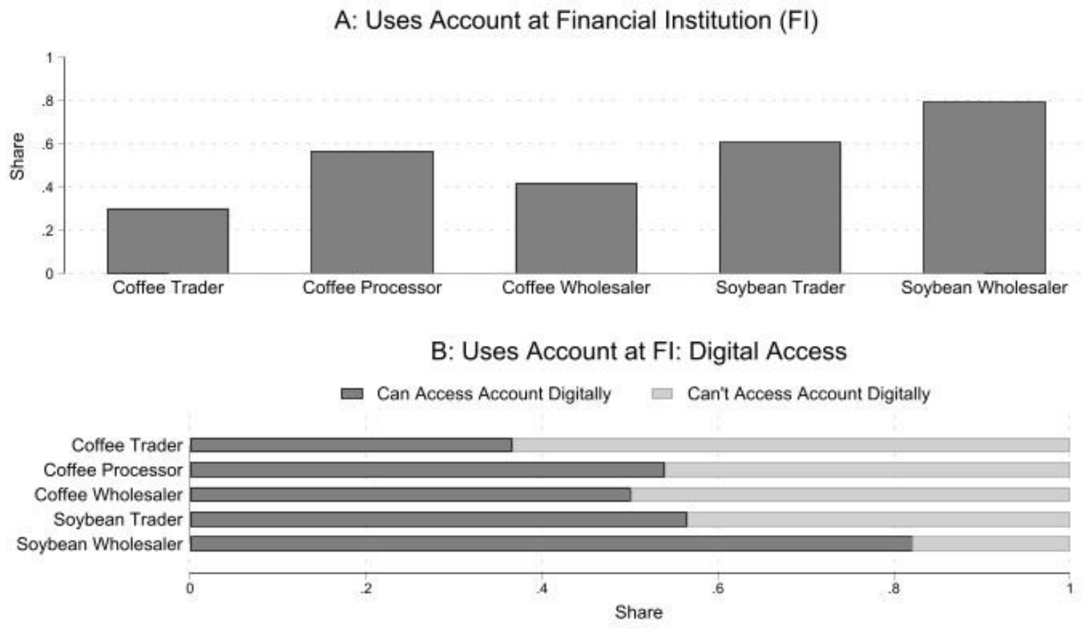


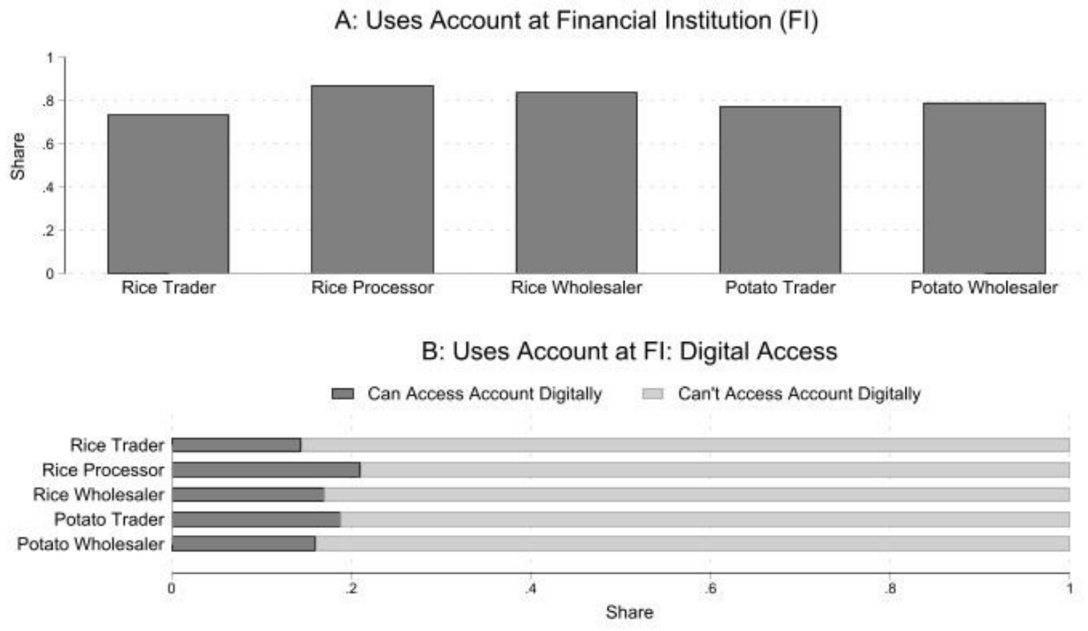


Fact 3:
Many intermediary actors have limited access to (digital) financial accounts

Many intermediary actors have limited access to (digital) financial accounts

Uganda and Bangladesh





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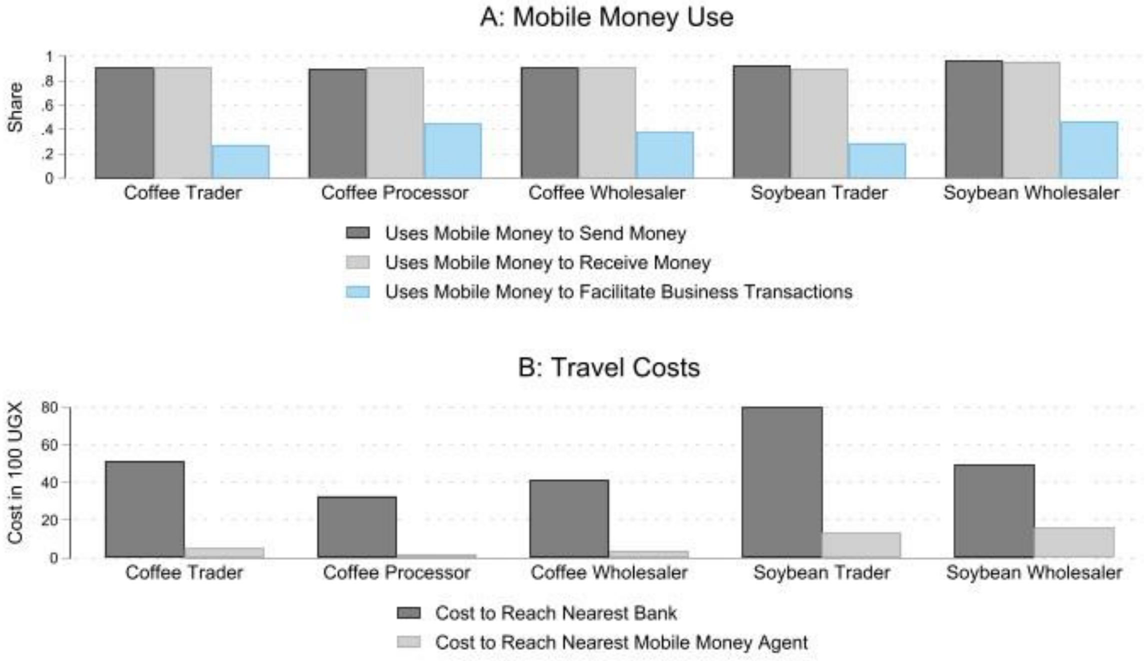
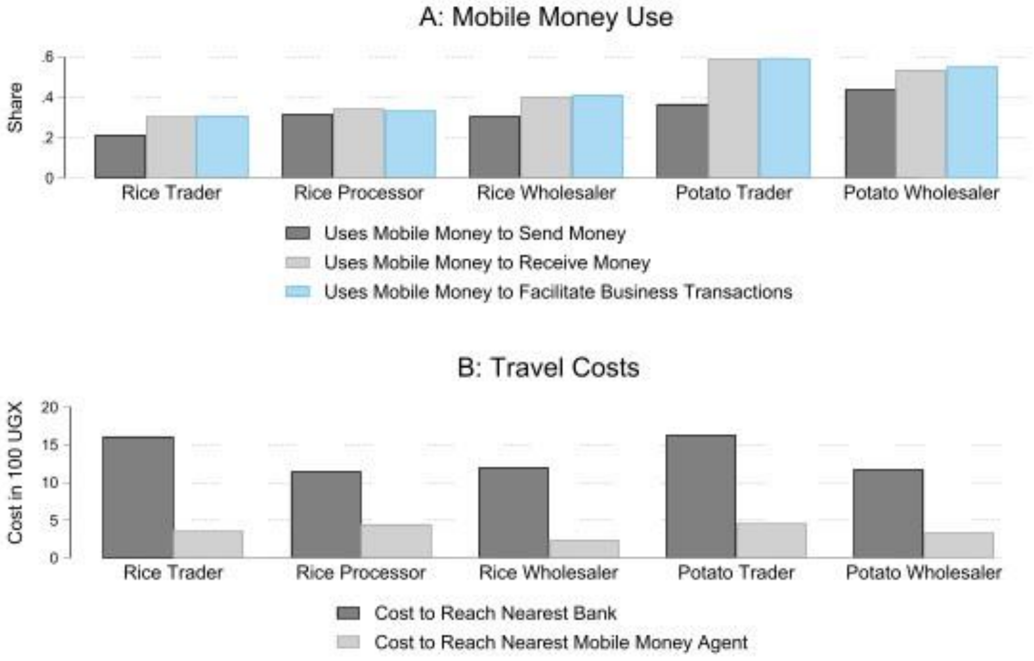
Fact 4:

Mobile money widely used personally, much less for enterprise transactions

Mobile money widely used personally, much less for enterprise transactions

Uganda and Bangladesh



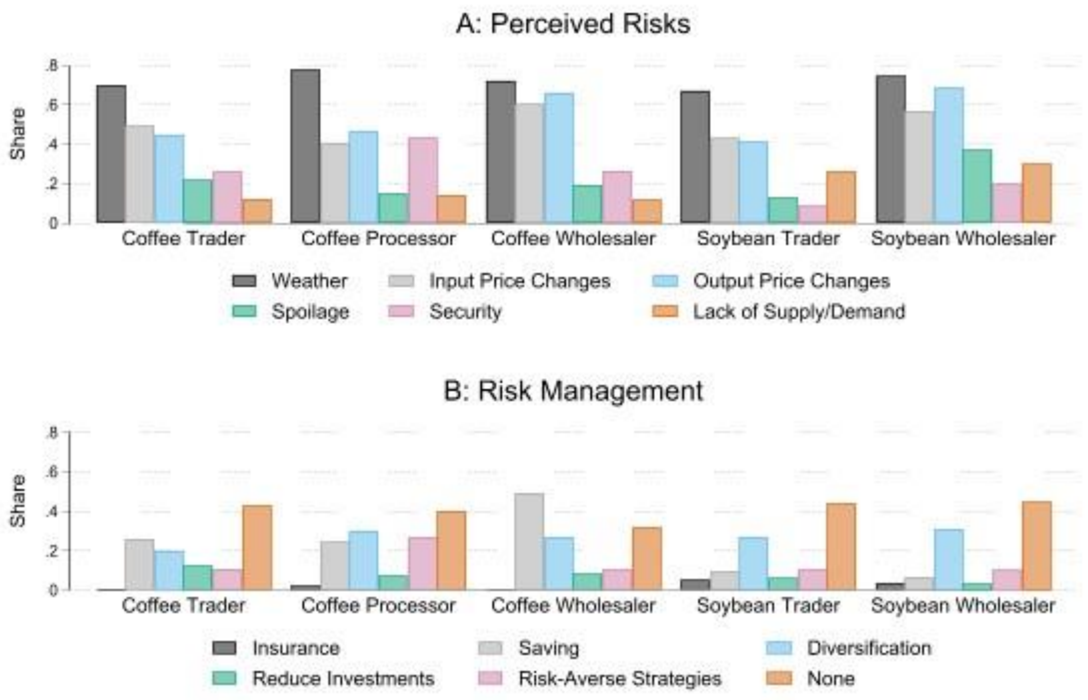


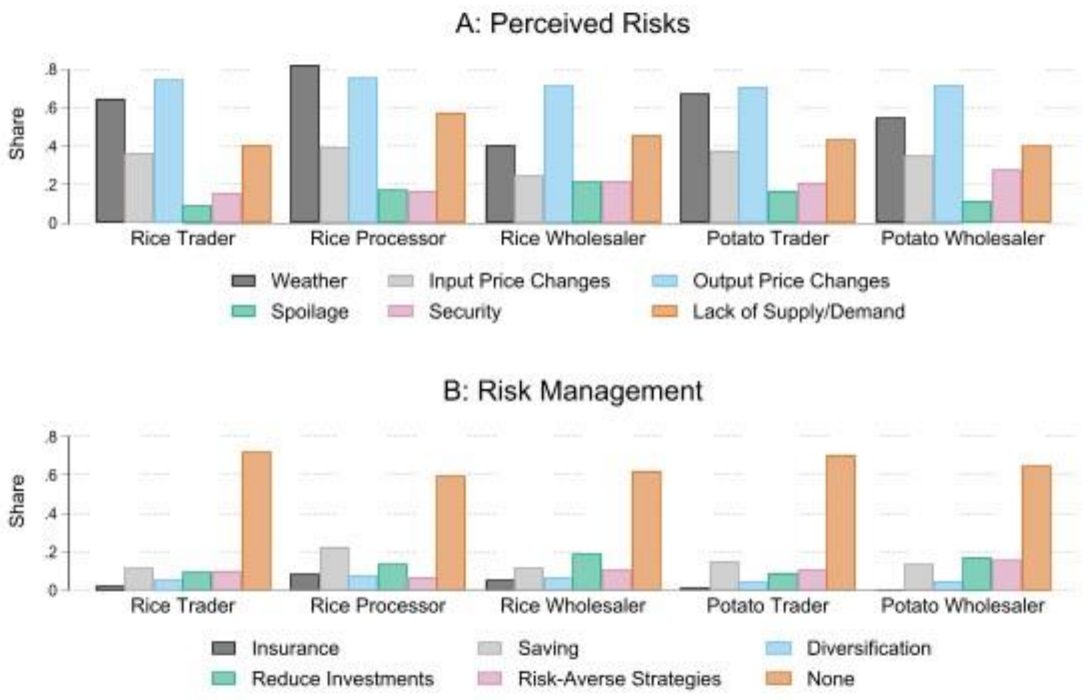
Fact 5:

Intermediary actors face considerable risks, but do little to manage these risks

Intermediary actors face considerable risks, but do little to manage these risks

Uganda and Bangladesh





Five Stylized Facts

1. Gender and age gaps in employment persist in agri-food value chains
2. Enterprise transactions are overwhelmingly conducted with cash
3. Many intermediary actors have limited access to (digital) financial accounts
4. Mobile money widely used personally, much less for enterprise transactions
5. Intermediary actors face considerable risks, but do little to manage these risks

IFPRI

Plenary Session C:
Next Steps &
Overview of Day 1

Rob Vos, Initiative Lead

CGIAR | Rethinking Food Markets and Value Chains for Inclusion and Sustainability

R E C E P T I O N

5.30 — 6.30

Welcome to Day 2

ROB VOS, Initiative Lead

CGIAR

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Plenary Session D: Policy Seminar

Conventional wisdoms about food system innovations and policies: myths and realities

Moderator: Charlotte Hebebrand, IFPRI

Introductory Remarks: Johan Swinnen, IFPRI Director-General

Presentation:

Thomas Reardon, MSU & IFPRI

Discussants:

Julio Berdegué, *Minister of Agriculture, Mexico (Online);* **Bart Minten**, *IFPRI (Online);* **Saweda Liverpool-Tassie**, *MSU (Online);* **William Buyungo Luyinda**, *Cofounder & CEO, EzyAgric (Online) ;* **Samson Akankiza Mpiira**, *Executive Director, DDA, Uganda;* **Wonekha Deogracious**, *Senior Dairy Development Officer MAIF, Uganda (Online);* **Rob Bertram**, *USAID (Online)*

BREAK

11.00 → 11.30

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Plenary Session E

What do we know about the degree of inclusiveness and employment generation potential of agrifood value chains?

Moderator: Ruth Hill, IFPRI

Presentations:

- **Carolina Trivelli**, *Instituto de Estudios Peruanos (Online)*
- **Jeff Bloem** and **Jasmine Jiang**, *IFPRI*
- **Erwin Corong**, *Purdue Univ.*, **Madhur Gautam**, **Will Martin**, and **Rob Vos**, *IFPRI*

Discussants:

- **Kristin Komives**, *ISEAL*
- **Hope Michelson**, *Univ. of Illinois at Urbana-Champaign*
- **Benjamin Davis**, *FAO (Online)*

Agrifood systems innovations and employment creation

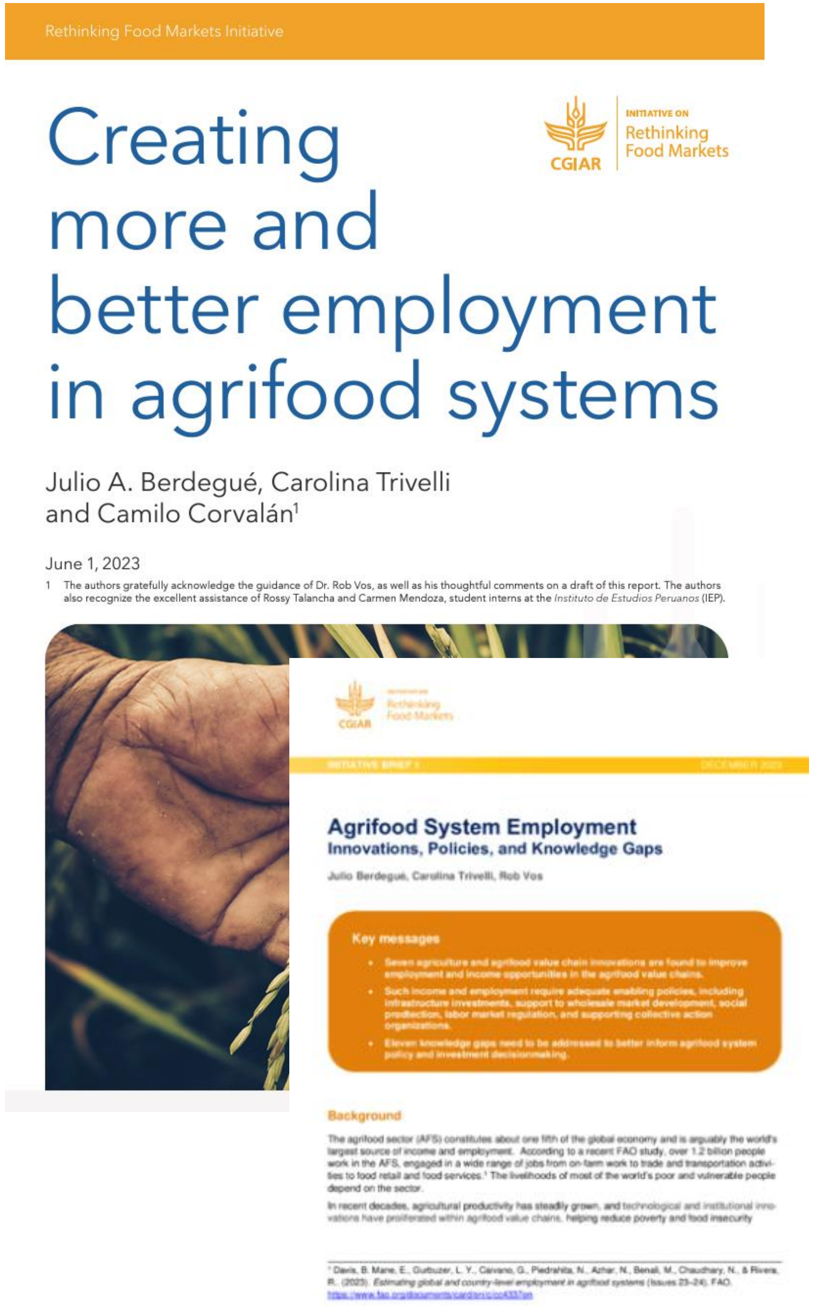
Julio Berdegué
Carolina Trivelli

December 2024

Innovations in AFS and employment

In 2022-2023, we reviewed 290 documents after a two-step search:

- A Search of conference journal articles, working papers, reviews, reports, and book chapters from 2000-23, was conducted using the keywords (“value chains” OR “agriculture” OR “farm” OR “non-farm” OR “food systems” OR “rural”) AND (“labor” OR “labour” OR “work” OR “job” OR “occupation” OR “employment” OR “working conditions” OR “social protection”).
- This search listed 167,182 documents as of March 31, 2023.
- The most cited documents from that list (300 entries) were identified and then reviewed for their relevance to our study. **139** texts were selected.
- Of these 139 papers, 21 were read but not used as they were not relevant to this review, and 118 were included in this review.
- An additional **151** documents were added as the analysis progressed, based on references in one or more of the texts in the original list, as were some articles recommended by experts with whom the team interacted.



Employment in AFS throuout the reviewed literature

The structural transformation revisited	Employment in agrifood systems	Rural employment diversification
The “hidden middle”	Intensification, automation, and digitalization	Contract farming
Working conditions and social protection	Female employment, gender and AVC	Youth

Reviewed publications

Color	Number of papers
Red	0 to 9
Yellow	10 to 19
Light green	20 to 29
Green	30+

Drivers/Effects	Quantity of jobs	Labor productivity	Income and/or wages	Diversification	Social protection	Working conditions	Others effects	Gender effects	Youth effects	Total by driver
Legal and regulatory changes	14	3	8	0	3	7	3	1	4	30
Technological innovations in primary production	23	30	27	2	1	2	6	5	11	60
Organizational changes in primary production	18	9	16	2	0	3	4	2	10	36
Technological innovations upstream or downstream	9	6	4	0	0	1	2	3	9	20
Private institutional changes	12	4	21	2	6	17	7	16	6	46
Changes in the structure and organization of the value chain	40	17	43	28	4	11	3	23	14	89
Changes in rural-urban linkages	9	6	6	3	0	0	2	4	10	25
Investments in public goods and services	3	7	4	0	0	0	2	1	8	28
Other changes in governance	5	6	4	2	2	8	3	4	4	22
Others drivers	16	13	13	13	10	4	4	25	14	73
Total by effect	109	72	122	47	21	43	32	71	33	

Innovations, policies and investments

Innovations	Employment effects	Inclusion effect
Mechanization	Mostly + (scale effect >? substitution effect)	
Digital innovations (on and off farm)	Mostly +	Mostly + (depending on connectivity and digital capability gaps)
Food standards that include labor provisions	Mixed results	Mixed results
Modern contract farming and VC contracting	Mostly +	Mixed results
Small-scale irrigation	Mostly +	Mostly +
Agroecology	Mostly +	Mostly +
Flexible labor contracts	Mostly +	Mixed results

Innovations, policies and investments

Policies and investments	Employment effects	Inclusion effect
Investments in infrastructure that "pull" rural employment and facilitate income diversification (public and private)	Mostly +	Mostly +
Modernization of wholesale markets	Mostly +	
Social protection linked with agricultural development interventions	Mostly +	Mostly +
Expanded social protection (with economic inclusion)	Mostly +	Mostly +
Labor market regulation	Mostly +	Mostly + (restricted to formal workers)
Collective action organizations	Mostly +	Mostly + (youth tends to be excluded)

LUNCH

12.30 — 1.30

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Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Plenary Session F

Feasibility of scaled agrifood value chain innovations, trade-offs and policy reform scenarios – model-based scenario analyses for Bangladesh, Ethiopia, Honduras, Nigeria and Uganda

Moderator: Rob Vos, IFPRI

Presentations:

Karl Pauw, **Valeria Piñeiro** and **Luis Escalante**, others, *IFPRI*

Discussants:

- **Sergiy Zoriya**, *Global Lead for Agricultural Policy and Public Expenditures, World Bank*
- **Ibrahim Tanimu**, *Director, Planning & Policy Coordination, Federal Ministry of Agriculture and Food Security, Nigeria (Online)*
- **Wonekha Deogracious**, *Senior Dairy Development Officer MAIF, Uganda (Online)*
- **Sudha Narayanan**, *IFPRI*
- **Byron Reyes**, *Alliance Bioversity & CIAT (Honduras)*

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Guidance documents for innovation adoption and support policies

Kristin Komives and Karin Kreider/Naomi Black, ISEAL

Presentations:

- **Girma Kassie**, *ICARDA* and **Nicholas Minot**, *IFPRI*
- **Bjorn van Campenhout**, *IFPRI* and **Richard Ariong**, *IFPRI*
- **Sarah Kariuki**, *CIMMYT*

Discussants:

- **Gashaw Abate**, IFPRI
- **Wonekha Deogracious**, *MAIF, Uganda (Online)*
- **Samson Akankiza Mpiira**, *Executive Director, DDA, Uganda*
- **Behailu Nigussie Demeke**, *Deputy CEO of the Ethiopian Commodity Exchange*

BREAK

3.15 → 3.45

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Plenary Session G

From pilot to scaling. How to determine scaling preparedness and scaling feasibility? Experience from Ethiopia, Honduras, Nigeria and Uganda

Moderator: Rajalakshmi Nirmal, IFPRI

Presentation: Minh Thai, IWMI

Discussants:

- **Thomas Reardon**, *MSU & IFPRI*
- **Samson Akankiza Mpiira**, *Executive Director, DDA, Uganda*
- **Michael Ogundare**, *CEO Crop2Cash, Nigeria*
- **Behailu Nigussie Demeke**, *Deputy CEO of the Ethiopian Commodity Exchange*
- **Guillermo Alvarado**, *Secretary General, Honduran Chapter of the Global Coffee Platform*

INITIATIVE ON
Rethinking
Food Markets

CGIAR

The Initiative on Rethinking Food Markets
Science, Innovation and Policy Symposium

Moving beyond the piloting with scaling preparedness and feasibility: Experience from Ethiopia, Honduras, Nigeria, and Uganda

Thai Thi Minh, IWMI, t.minh@cgiar.org

Rajalakshmi Nirmal, IFPRI, r.nirmal@cgiar.org

Rob Vos, IFPRI, r.vos@cgiar.org

Key concepts

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Scalability

Innovation's ability to adapt to the new scaling contexts and respond to changes during the scaling process, and anticipated performance, impact, and trade-offs when going to scale

Intervention

Identifying

Designing

Bundling

Piloting

Scaling

Strategizing

Evaluating

Bundled innovations

Scaling feasibility

The possibility that the scalable innovation can be scaled to achieve larger-scale impacts

Scaling contexts

Bio-natural-physical-climatic features

Socio-economic-institutional characteristics

Challenges and opportunities

Existing partnerships, networks, investment

Available and resources needed for scaling

Scaling preparedness

The ability of food systems, market actors, and relevant stakeholders to scale and accelerate the scaling innovation

Identify scalable innovation/bundle

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Dimensions	Indicators	Description
INNOVATION SCALABILITY		
Innovation	1. Type of innovation	Incremental, radical, disruptive
	2. Innovation attribute	Maturity, availability in the market, target value chains
	3. Intervention	Timing of intervention, investment needed, required resources, return on investment
	4. Desired impacts	Nutrition, health, and food security; Poverty reduction, livelihoods, and jobs; Gender equality, youth, and social inclusion; Policy and institution
Context	5. Potential new conditions	Demands, challenges, opportunities, potential risks in new scaling context/value chains
	6. Ability to adapt	Ability to adapt to new demands, challenges, opportunities, potential risks
Scaling status	7. Adoption status	Current users, their accessibility and affordability to the intervention, drivers to adopt
	8. Scaling extent and speed	Other user segments, potential geographical reach, time frame for scaling
	9. Unintended negative outcomes	Undesired impacts/trade-offs, possible adjustments of intervention to reduce the trade-offs
SCALING PREPAREDNESS		
Stakeholder engagement	10. Stakeholders involved	Diverse actors and stakeholders
	11. Engagement degree	Stakeholder interests, attitude, and acceptance to participate
Stakeholder commitment	12. Stakeholder ownership	Stakeholder participation in intervention activities, their commitment to the achievement of intervention goals, their demand for accountability regarding intervention
	Buy-in and continuation	Investment in innovation, intervention, and scaling
Stakeholder accountability	Resource contribution and investment	Available resources, time investments, budget and staff contribution, capacity

Identify scalable innovation/bundle

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Food Markets

Dimensions	Indicators	Description
		INNOVATION SCALABILITY
Innovation	1. Type of innovation	Incremental, radical, disruptive
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	4. Desired impacts	reduction, livelihoods, and jobs; Gender nd institution
Context	5. Potential new con	l risks in new scaling context/value chains
	6. Ability to adapt	pportunities, potential risks
Scaling status	7. Adoption status	lity to the intervention, drivers to adopt
	8. Scaling extent an	each, time frame for scaling
	9. Unintended nega outcomes	ments of intervention to reduce the trade-
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	Buy-in and continuation	Investment in innovation, intervention, and scaling
Stakeholder accountability	Resource contribution and investment	Available resources, time investments, budget and staff contribution, capacity

Five levels scale to score scaling potential

1. Very low
2. Low
3. Neutral
4. High
5. Very high

Scalable innovation overview

Innovation	Innovation scalability	Scaling preparedness	Scaling potential
Ethiopia: Smart sesame marketing	3.8 Relatively high	3.5 Neutral to high	3.65 Relatively high potential
Honduras: Quality assessment for transforming private intermediation markets	4.3 High	3.6 Relatively high	3.95 High potential
Honduras: Women typology in coffee supply chains	3.7 High	3.1 Relatively high	3.4 Neutral
Honduras: Digital infrastructure	3.5 Relatively high	3.8 High	3.65 Relatively high
Honduras: Improving business relationship	4.1 High	4.2 High	4.15 High potential
Honduras: New food formulation and packaging	3.2 Neutral	3.3 Neutral	3.25 Neutral
Nigeria: Cool transportation and cold storage	4.2 High	4.4 High	4.3 High
Nigeria: Solar dryers	3.7 Relatively high	3.2 Neutral	3.45 Neutral
Nigeria: Plastic crate rental and market support	3.8 Relatively high	4.4 High	4.1 High
Nigeria: Digital financial services	4.3 High	4.0 High	4.15 High
Uganda: Milk analyzers	3.3 Neutral	4 High	3.65 Relatively high
Uganda: Ezy Agric digital platform	4.2 High	3.7 Relatively high	3.95 High potential

Ethiopia deep dive: Smart Sesame marketing bundle (1)

SSM scalability: Relatively high

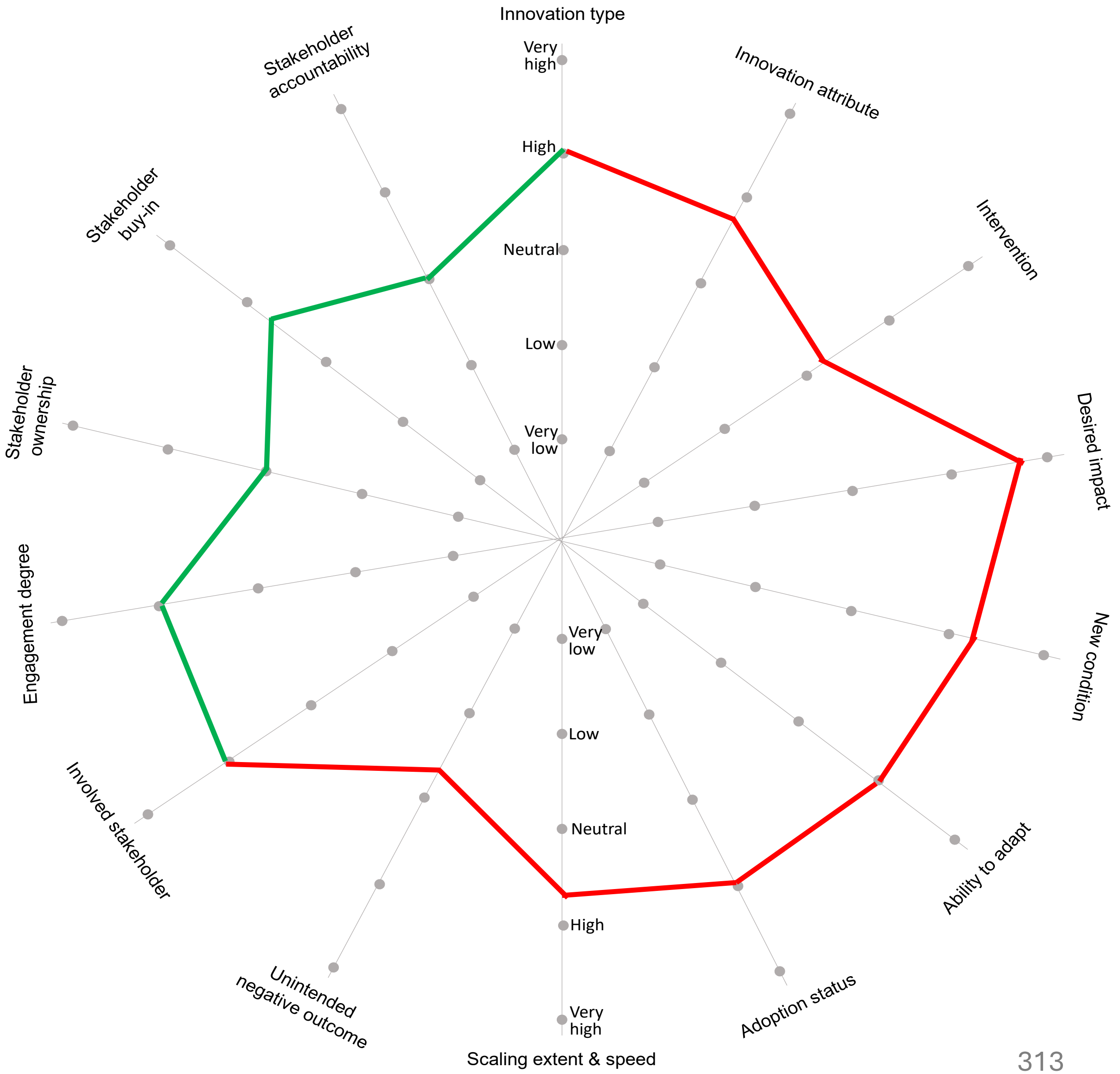
- SSM is understandable, compatible, timely, and easy for the cooperatives and traders
- Intervention's accessibility, acceptability, and affordability for smallholder farmers, partners, and stakeholders
- Requiring resources, project push, bundling-related technical assistance, and strong stakeholder support

Scaling preparedness: Neutral to high

- Diverse stakeholder Involvement with high interest, acceptance, loyalty to contribute, and commitment to achieving the goals
- Limited ownership, buy-in, and accountability

Scaling potential: Relatively high

It is scalable but requires technical backup and additional interventions to advance the technology while mitigating uncertainties due to collective action, organization dynamics, hoarding, and artificial shortages, which are unintended adverse outcomes.



Ethiopia deep dive: Pathways to scale SSM (2)

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Critical contextual challenges:

- Climate hazards (e.g., heavy rains, unpredicted drought, and flood) and weather variation)
- Ongoing civil war, tensions between ethnic groups, displacement, political instability, and security
- Limited market access, low profitability, market saturation, and high inflation
- Resource gaps: limited access to loans/credits; staff changes, expectations, and availability, with limited expertise and know-how to design and bundle innovation; challenges for farmers to afford telecommunication services

Available resources and structures:

- Telecom infrastructure
- Existing networks/platforms: ECX platforms, primary transaction centers, and market information forecast.
- Ongoing investment and initiatives: upgrading and expanding telecom infrastructure, Digital Ethiopia 2022, Sesame Business Networks

GOAL: Improve market inclusion and sustainable livelihoods for smallholder farmers

Pathway 1. Enhancement of the market efficiency of 55,000 sesame producers in Humera and Quara

- Improve access to market information
- Enhance collective action strategies
- Invest in innovative markets

Time frame: 2025 – 2027
Actors: existing partnerships, businesses, and services from cooperatives, regional trade offices, ECX, Ethio Telecom, Research Centers, and development projects

Pathway 2. Establishment of a foundation to scale SSM bundle reaching 70% sesame producers with market information

- Enhance stakeholders' orientation, awareness, and capacity
- Establish market and information networks

Time: 2025 – 2030
Actors: Existing partnerships, implementing partners, and all responsible public and private stakeholders

Honduras deep dive: Quality assessment

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The **quality assessment** bundle has high scalability and neutral to high scaling preparedness**.** It is scalable but requires interventions to enhance stakeholder ownership, buy-in, and investments.

GOAL: Capitalize multi-stakeholder involvement to coordinate the implementation of strategies and technical assistance, quality measurement, and unlock business and culture challenges.

Pathway 1. Direct intervention by the State and other actors

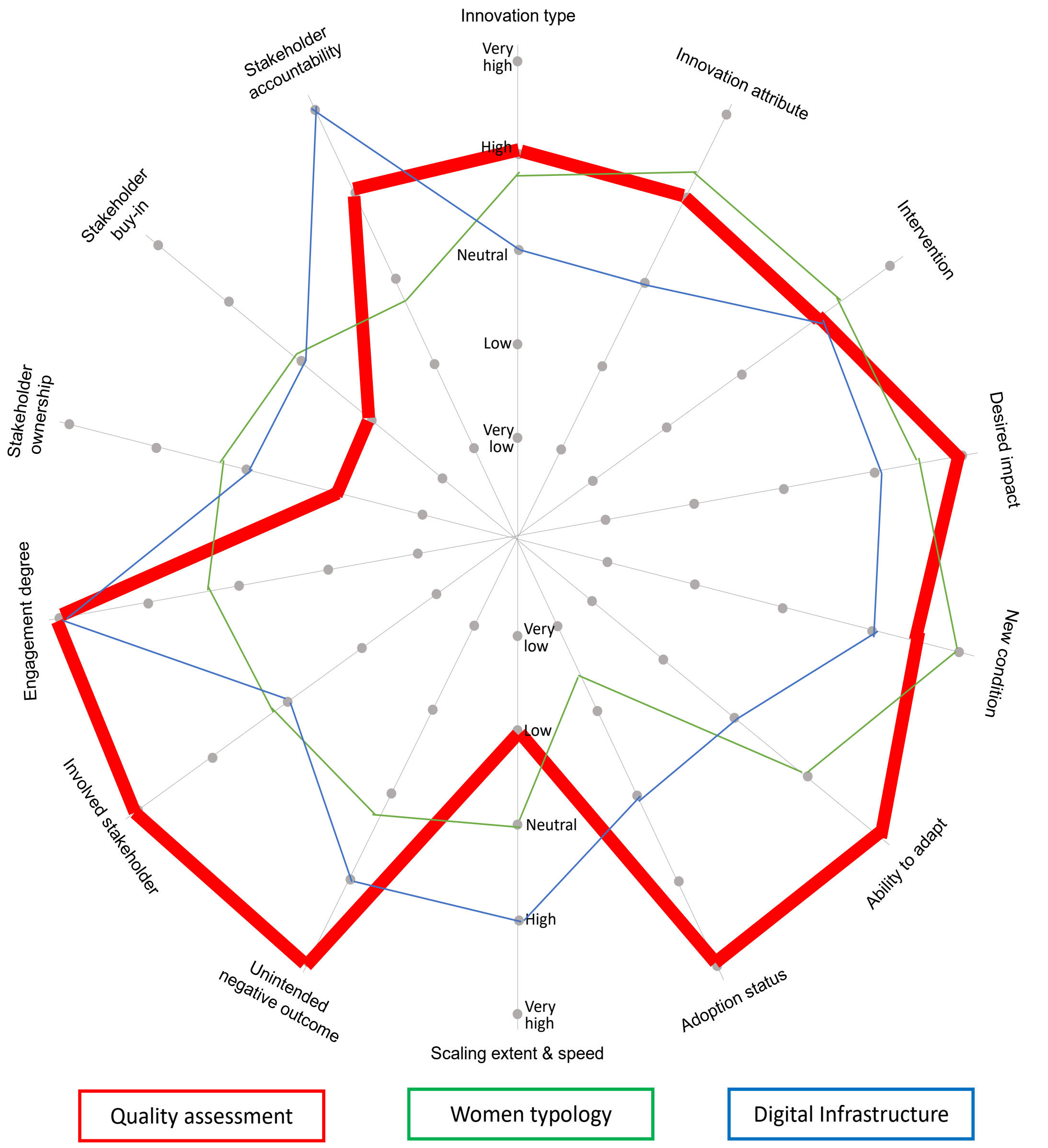
- Ensure compliance with regulations by the State
- Strengthen the capacity for producers by other actors
- Facilitate the implementation of strategies by the Global Coffee Platform
- Mobilize the involvement and investments from the private sector actors, i.e., BECAMO, AMUCAFE, ANACAFEH

Pathway 2. Creation of inclusive chain linkages

- Bring buyers closer to producers by integrating into existing business models and process automation
- Integrate donors, NGOs, the State, and other stakeholders to support implementing strategies
- Leverage long-term relationship reputation

Pathway 3. Enhancement of contract fulfillment

- Establish multi-actor contract-warranty agreements between the private sector (banks/ buyers), producers, and the government
- Monitor contract deployment and fulfillment to ensure seller-buyer business relationships and roles of buyer-as-guarantor for the bank



Nigeria deep dive:
Cool transportation and cold storage

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The **cool transportation and cold storage** bundle has high scalability and high scaling preparedness. It is scalable but requires concrete interventions to incentivize the private sector's investment and investors' funding to lower the initial investment and improve the enabling environment

GOALS: Eliminate food spoilage to enhance the sustainability of Nigeria's fruit and vegetable value chains

Pathway 1. Provide end-to-end cold chain infrastructure and services (2025-2027)

- Map and identify market and aggregation centers suitable for the cold facility installment
- Develop the technology/process from end-to-end
- Sensitize farmers on cold storage and transportation for pre-cooling.
- Train farmers on agronomy practices and harvesting for cold storage
- Develop flexible logistics and different types of products to be transported

Pathway 2. Improvement of enabling environment and infrastructure

- Optimize the transport route (Explore Onitsha, Port Harcourt)
- Policy intervention, e.g., price subsidy and good road networks and the transportation cost
- Collaborate with funders and stakeholders to lower the financial constraints to invest in cool transportation and cold storage

Nigeria deep dive: Plastic crate rental and market support

The **plastic crate rental and market support** bundle has high scalability and relatively scaling preparedness**.** It is scalable under the conditions of mobilized investments and raised awareness amongst farmers.

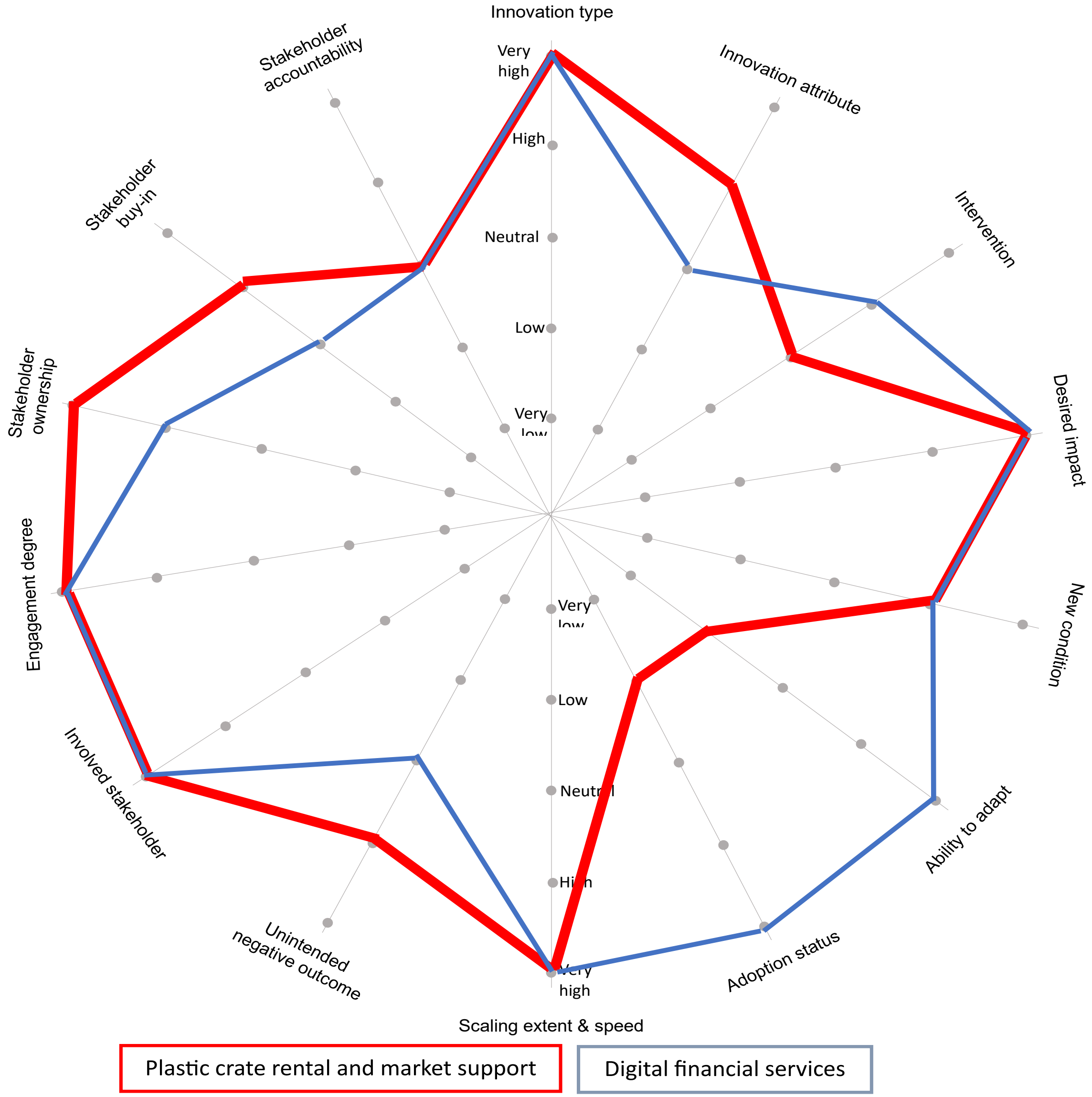
GOAL: Reduce post-harvest losses and improve logistics and food availability for smallholder vegetable producers

Pathway 1. Capitalization of investment in plastic crate rental and market support

- Increase plastic crates and invest in transportation means for returning crates
- Collaborate with the tomato association to buy and invest more in procuring plastic crates.
- Diversify markets and aggregation centers to increase/ensure reasonable profits from the investment in plastic crates
- Establish a direct market linkage with processing companies.

Pathway 2. Creating inclusive chain linkages

- Digitalize awareness creation and communication on plastic crates rental and market support
- Provide GAP and post-harvesting handling training for farmers
- Bundling cool transportation and sold storage with crate rental



Uganda deep dive: Milk analyzers

The **milk analyzer bundle** has neutral scalability and high scaling preparedness. It has high demand, and scaling is essential to speed up milk analyzer adoption, quality compliance, and bundling with other solutions to enhance market access.

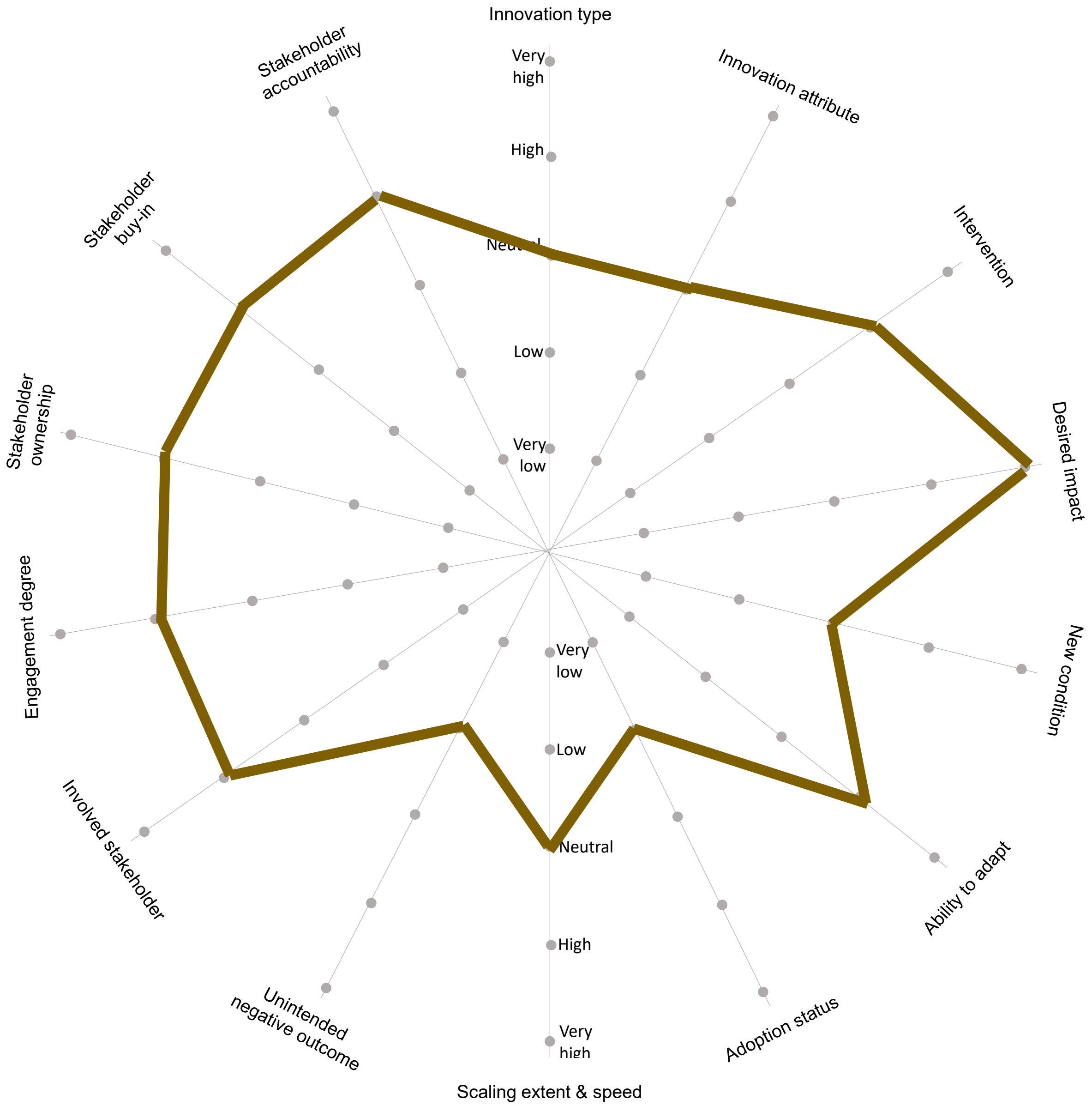
GOAL: Upgrade Uganda's dairy value chain by increasing milk quality and market access for milk collector centers and farmer suppliers

Pathway 1. Catalyzation of milk analyzers to target 600 milk collection centers (MCCs) in three milk sheds and 600,000 household suppliers (2025-2027)

- Facilitate licensing for 600 MCCs;
- Reduce post-harvest losses from 10% to 3% in two years
- Build a pool of technicians for repair and maintenance
- Enforce milk quality regulations
- Develop training centers and credit facilities in the areas

Pathway 2. Improvement of market access along Uganda's dairy value chain

- Link dairy farmers to profiled, quality input suppliers
- Rehabilitate and equip the existing MCCs
- Build capacity for technicians to use/repair/maintain milk analyzers
- Train farmers on hygienic milk handling and good animal husbandry for quality milk production
- Establish traceability, data management, and evaluation systems
- Formulate quality and disease control policies
- Improve feeding and breeding



Uganda deep dive: Ezy Agric Digital Platforms

INITIATIVE ON
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Food Markets

The **Ezy Agric Digital Platforms** bundle has high scalability and neutral to high scaling preparedness. Its scaling is essential to enhancing the involvement and buy-in of stakeholders, especially input and information service providers.

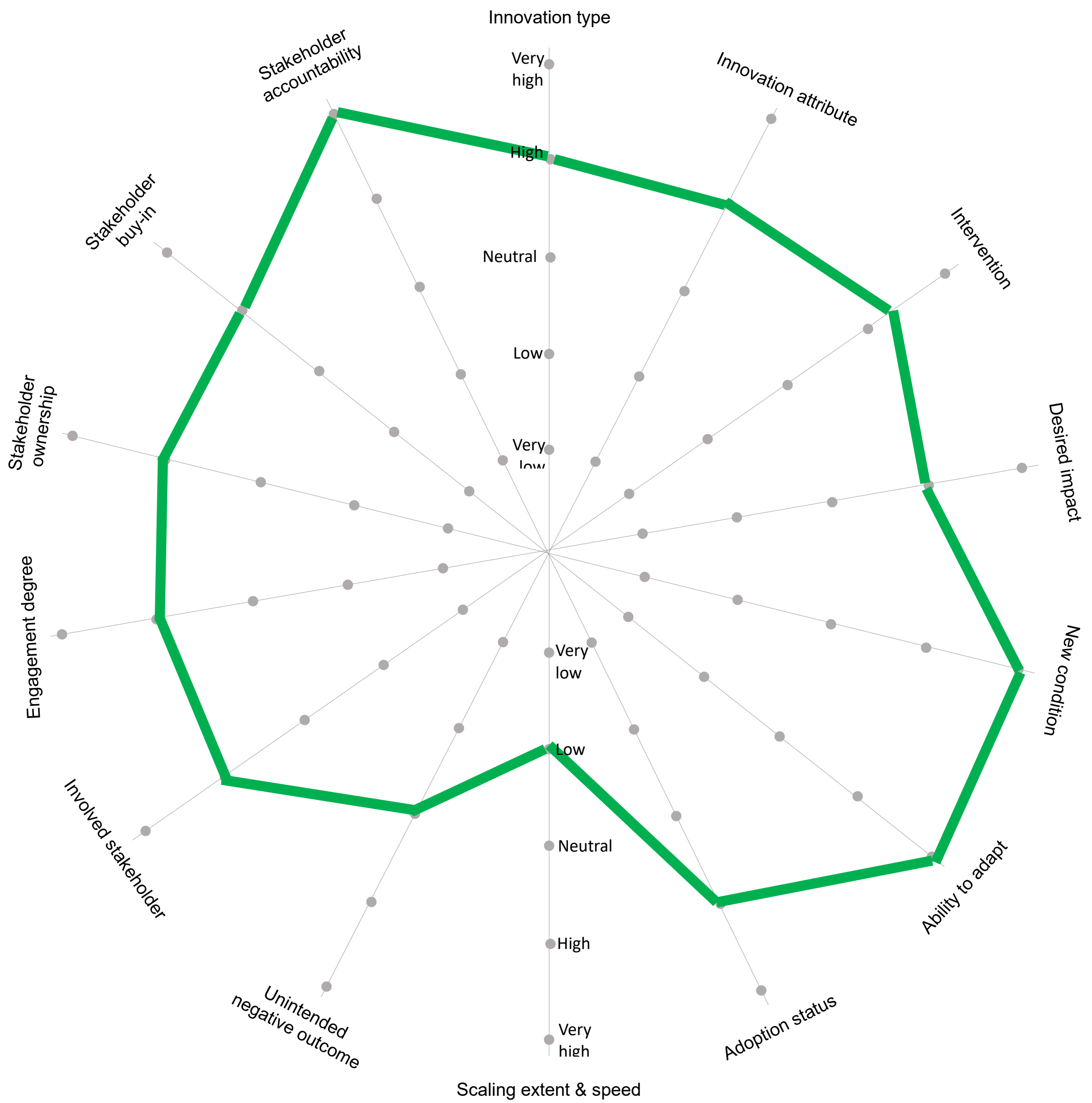
GOAL: Improvement of digital literacy and input provision and information services for 400,000 registered farmers

Pathway 1. Equipment of digital agric services for 10,000 merchants/dealers

- Partner with capacity-strengthening institutions to provide tailor-made training for merchants
- Create awareness and strengthen capacity for merchants/dealers
- Build and operationalize trusted networks of merchants

Pathway 2. Increase of active usage by 20% of the registered farmers in 5 years

- Incentivize the provision and use of Ezy Agric Digital Platforms
- Improve extension support and services
- Leverage existing partnerships and business relationships to enhance the benefits of Ezy Agric Digital Platforms to the registered farmers



Highlights

- **Scalability** of most innovation bundles is from neutral to high, showing their high relevance and value-added to enhancing food market and value chain inclusion and sustainability
- Although **scaling preparedness** varies depending on the design of the intervention process, established partnerships, and stakeholder involvement, stakeholder ownership, buy-in, and accountability are generally limited.
- Across innovation bundles, their ability to adapt to new contexts, adaption status, scaling extent and speed, and stakeholder ownership, buy-in, and accountability are critical to their **scaling feasibility.**
- Scopes of **scaling pathways** vary depending on “who is leading and owning the pathway.”
- Capitalizing the existing partnerships, momentums, and stakeholder engagement is key to facilitating the investment and implementation of the scaling feasibility

CGIAR Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Closing Panel Discussion

Rethinking Food Markets: what have we learned, what are the challenges and what is next for policy and research?

Moderators: Rob Vos, IFPRI and Christine Chege, Alliance Bioversity & CIAT

Discussants:

Johan Swinnen, *IFPRI*; **Thomas Reardon**, *MSU;* **Ruth Hill**, *IFPRI*; **Hope Michelson**, *Univ. of Illinois at Urbana-Champaign;* **Saweda Liverpool-Tassie**, *MSU;* **Jenny Wiegel,** *Alliance Bioversity-CIAT, Nicaragua;* **William Buyungo Luyinda,** *Cofounder & CEO, EzyAgric (Online);* **Samson Akankiza Mpiira**, *Executive Director, DDA, Uganda;* **Wonekha Deogracious**, *Senior Dairy Development Officer MAIF, Uganda (Online)*

R E C E P T I O N

5.30 — 6.30