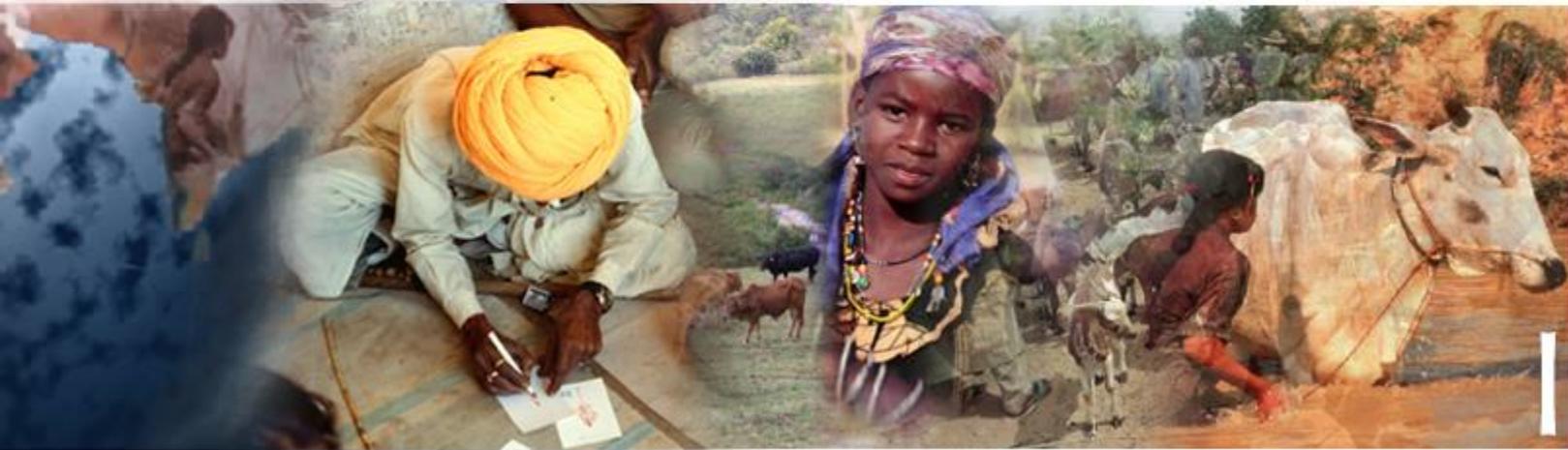# Improving food safety and quality in traditional dairy value chain in Assam: an assessment of economic impact

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International Livestock Research Institute

Introduction

- ✓ Traditional dairy systems are predominant in Assam, one of the poorest states in NE India.

- ✓ The traditional milk market comprises 97% of the total milk produced and marketed; only 3% is channeled through the formal, organized processing channel. However, because producers on average only sell some 17% of the milk they produce, the local market only supplies some 66% of total consumption. The rest, about 34% is supplied by dairy products imported from outside the State.

- ✓ The predominance of traditional or informal milk and dairy product market agents in Assam highlight the importance of these agents as the key link between local milk producers and consumers.

- ✓ There is growing concern about milk hygiene and quality as demand for milk rises in the state. Consumers (particularly those in urban areas) have expressed concern about the quality of local fresh milk that are supplied by milk traders.
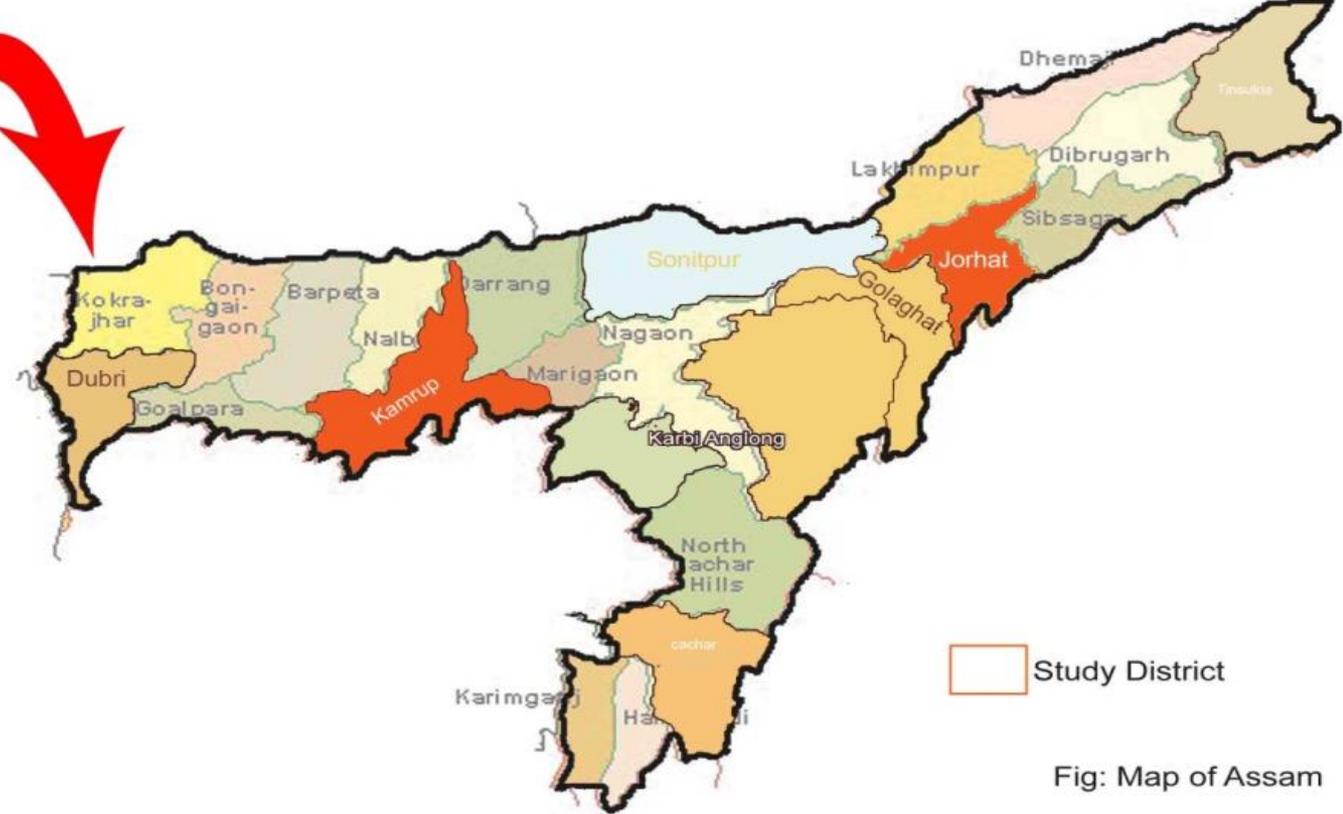
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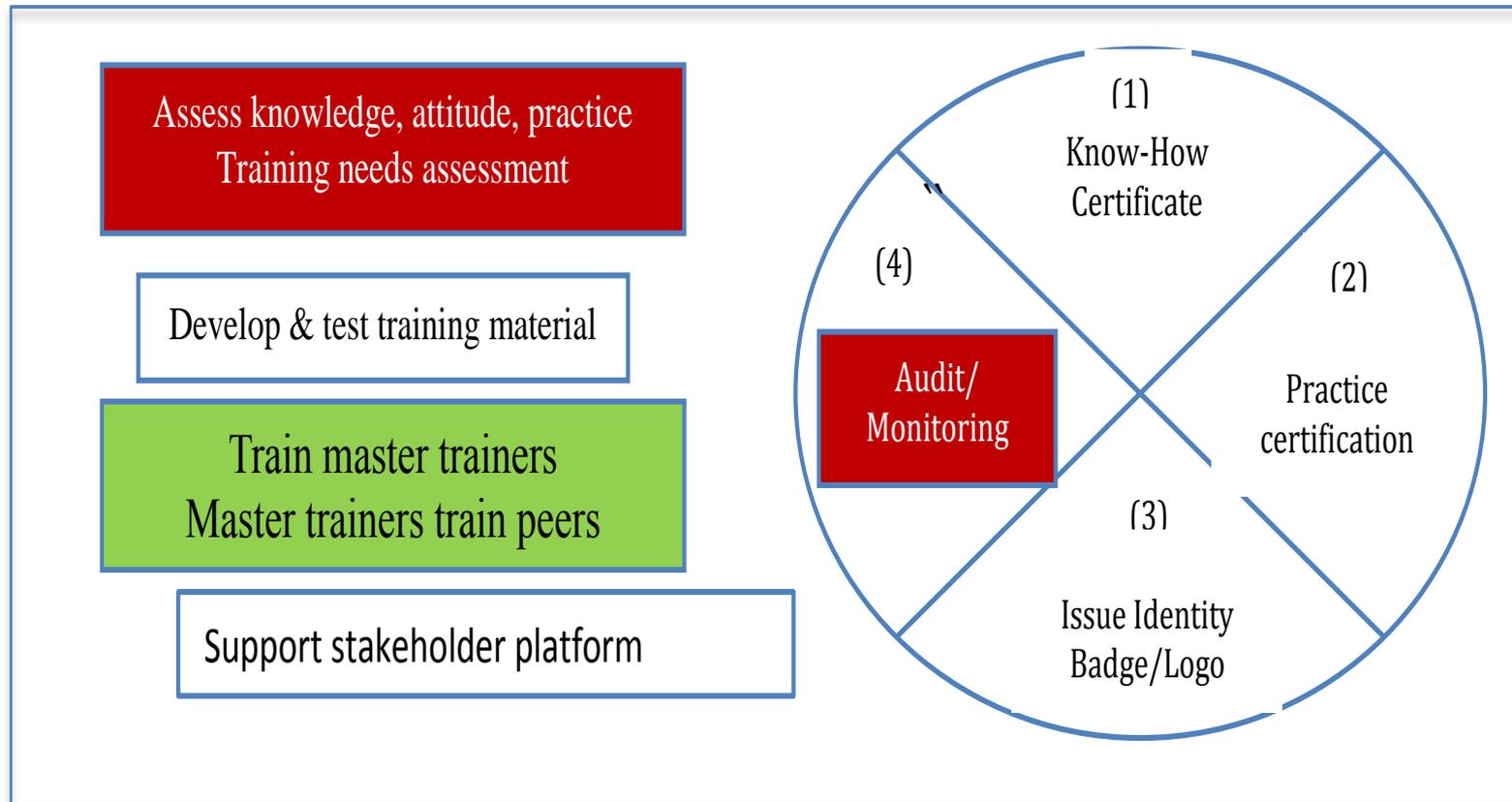# Milk and dairy product flow, Assam (ILRI 2007)
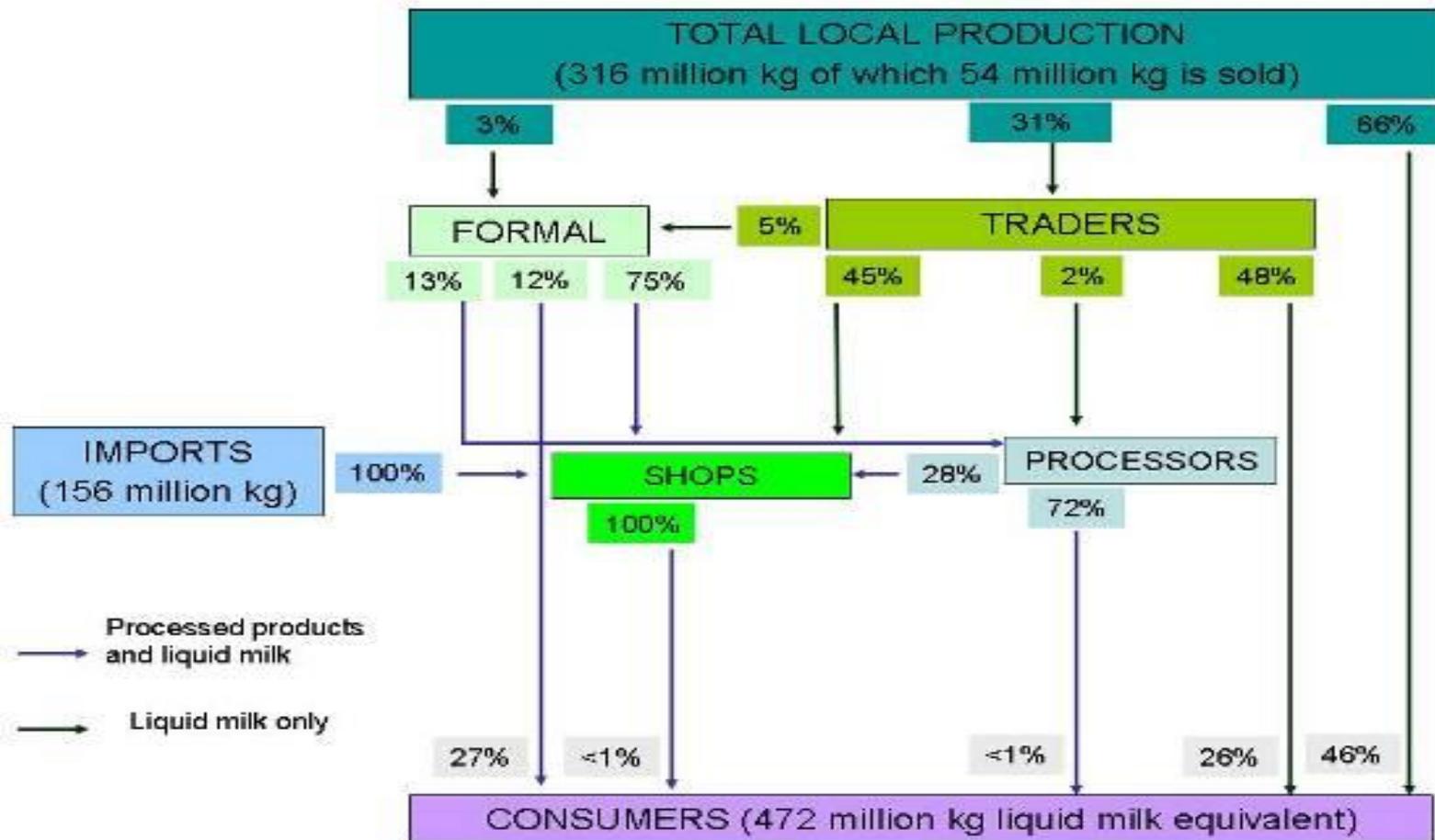
The GET Dairy Project

- ✓ To assess the impact of traditional dairy system in Assam in order to generate evidence for scaling up/out the intervention to larger areas (2009-2012).

- ✓ Builds on previous ILRI initiatives in Assam (Comprehensive Dairy Sector Study, WB and Gov of Assam, 2006-2007; Knowledge to Action: enhancing traditional dairy value chain in Assam, 2008-2010) with partial funding from DFID sponsored RIU program.

  - ✓ Knowledge, Attitude and Practices (KAP) and milk quality assessment surveys on traditional dairy sector in 4 districts (Kamrup, Jorhat, Sonitpur & Barpeta, with local partners Dairy Development Department (DDD), Assam Agricultural University (AAU), Greater Guwahati Cattle Farmers Association and a local NGO))

  - ✓ Design and draft customized training manuals for capacity building of market actors on hygienic milk production and handling after a rigorous process of participatory training need assessment.

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The Study Sites

Fig: Map of Assam

The action research: model for improving traditional dairy sector

Assess knowledge, attitude, practice Training needs assessment

Develop & test training material

Train master trainers Master trainers train peers

Support stakeholder platform

(1) Know-How Certificate

(2) Practice certification

(3) Issue Identity Badge/Logo

(4) Audit/ Monitoring

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Research Questions

✓ How does training and certification of informal dairy chain actors change knowledge, behavior and milk quality/safety outcomes?

✓ How does participation in the training and certification scheme translate into livelihood benefits for milk value chain actors and reduced health risks for dairy consumers?

✓ How can sustainability be assured? What incentives are necessary to motivate participation in training and certification? How can the system be self-financing and credible?

✓ What are the economy-wide impacts of these programs? What are the overall costs and benefits of the initiatives? Who gets the benefits and who pays the costs?

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Objectives of the GET Dairy Project

- ✓ To evaluate the ILRI model for improving traditional dairy sector (based on training and certification of informal value chain actors) by assessing the impacts on capacity of value chain actors and net benefits accruing to milk value chains and consumers.

- ✓ To understand and document the process of policy influence and change which supports local ownership and sustainability of this model for improving the traditional dairy sector.

- ✓ To assess the economic impact and cost-benefit of the model for improving the traditional dairy sector.

- ✓ To gather lessons from the Assam experience to inform dairy development elsewhere.

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Data sources and methodology

✓ Evaluation of impacts of training and certification

  ✓ prospective matched cohort study using a double difference design (before and after, with and without intervention), using 2009 surveys as baseline (KAP, milk quality assessment).

  ✓ 2 districts: Kamrup (exposed site), Jorhat Town (control site)

  ✓ Sampling groups

    ▪ Traders/producers who were interviewed during baseline in 2009 and received training (Yes-Yes) in 2009-2011

    ▪ Traders/producers who were interviewed during baseline in 2009 but did not receive training (Yes-No) in 2009-2011

    ▪ Traders/producers who were not interviewed during baseline in 2009 but received training (No-Yes) in 2009-2011

    ▪ Every third trader from the list of traders who were not considered in above 3 sampling

    ▪ Traders who were neither interviewed during baseline in 2009 nor availed training in 2009-2011 and did not come into the contact of interviewed/trained traders (control group).

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Data sources and methodology

- ✓ Qualitative analysis of the process of influencing policy
  - ✓ Outcome mapping (**www.idrc.ca/evaluation**).
  - ✓ Focus group discussions and key informant interviews

- ✓ Evaluation of economic impact and cost-benefit analysis.
  - ✓ Partial equilibrium displacement model (Kaitibie et al., 2008 on dairy policy in Kenya); ex-post assessment using historical milk price data as well as survey data to model the impacts of the changes in policy on farm and retail prices, as well as on the economic welfare of farmers, informal sector traders, consumers and input suppliers.
  - ✓ Transaction costs resulting from milk loss due to adverse police action, political rent to avoid police action, quality loss due to milk becoming sour and direct confiscation of milk and containers and used the reductions in transaction costs associated with project activities as the basis from which to calculate welfare benefits and their distribution, cost benefit, net present value and internal rate of return.

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Evaluation of Economic Impacts

Traders and exposure to training: comparing outcomes between milk traders who have undergone training and milk traders who have not undergone training in the exposed site (Kamrup), baseline and current

Producers and exposure to training: comparing outcomes between producers who have undergone training and producers who have not undergone training in the exposed site (Kamrup), baseline and current

Hypotheses:

- Training in milk handling will have precipitated changes in milk handling practices that are then rewarded by consumers with either higher prices or more quantity sold.

- Increased prices or higher volume of sales are hypothesized to have been engendered by the consumer recognition of improved milk quality and safety from better trained milk traders.

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Milk traders: comparing with and without training

	Exposed (Kamrup)				
	With training		Without training		P value
	Mean	STD	Mean	STD	
1. Total milk procured per day (liter)	146.79	266.50	86.03	181.19	0.09
2. Total milk sold per day (liter)	151.56	266.43	90.15	186.74	0.09
3. Cost of milk procured per day (RS)	4129.70	8085.92	2236.20	5530.79	0.08
4. Cost of operations per day (RS)	260.47	325.29	153.68	139.81	0.00
5. Total costs/day (3+4) (RS)	4390.17	8375.34	2389.88	5661.26	0.07
Cost/liter milk sold (RS)	28.97	11.50	26.51	13.77	0.56

- Training outcomes: higher milk volume procured and sold, higher costs

Producers: comparing with and without training

	Exposed (Kamrup)				
	With training		Without training		P value
	Mean	STD	Mean	STD	
Total milk produced/day (liter)	81.81	52.54	71.73	52.65	0.28
Total value of milk produced/day (RS)	2332.15	1532.44	2078.22	1576.92	0.39
Weighted price of milk produced/day (RS/liter)	28.28	2.01	28.60	1.29	0.09

- Training outcome: higher production volume, slightly lower price per liter of milk produced

Milk traders: comparing baseline and current

	Baseline		Current		P value
	Mean	STD	Mean	STD	
1. Milk sales to:					
Consumer household (liter)	73.52	88.13	33.06	29.93	0.00
Consumer sale point (liter)	0.00	0.00	28.16	76.89	0.01
Vendors (liter)	0.00	0.00	9.59	41.68	0.10
Hotel/sweet market (liter)	170.80	238.50	74.08	156.91	0.02
Cottage processor (liter)	0.00	0.00	4.16	28.57	0.31
Other (liter)	1.20	8.49	1.37	3.64	0.90
2. Own household consumption (liter)	9.43	42.87	2.32	1.18	0.25
Quantity of milk traded per day (liter)	254.95	297.72	152.74	253.76	0.07
Total value of milk traded (RS)	5430.99	6313.61	4729.03	8056.61	0.63
Weighted price (RS/litter)	21.72	1.64	29.54	2.52	0.00

Temporal effects (all sample): decline in quantity sold; increase in price/liter

Producers: comparing baseline and current

	Baseline		Current		P
	Mean	STD	Mean	STD	Value
1. Milk sales to:					
Vendor	52.00	83.84	52.00	41.75	0.98
Cooperative	5.10	19.14	5.40	16.55	0.94
Consumer household	6.00	19.86	3.00	10.82	0.20
Other	0.00	2.14	0.00	0.00	0.32
2. Farmer own household consumption	3.10	1.61	2.90	2.28	0.54
Total qty of milk produced/day (liter)	66.40	84.15	63.40	45.55	0.77
Total value of milk produced/day (RS)	1333.28	1770.53	1776.95	1361.83	0.07
Weighted price (RS/liter)	20.08	4.69	28.03	6.39	0.00

Temporal effects (all sample): increase in revenues and price per liter of milk

Estimates of economic benefits (actor level, matched sample in baseline and current)

	Control (Jorhat)			Exposed (Kamrup)		
	Producer	Trader	Consumer	Producer	Trader	Consumer
Number of observations	50	34	27	112	192	45
1. Buying price	-	27.18	30	-	29.91	33
2. Selling price	24	27.8	-	28.61	31.16	-
3. Profit margin	*	0.62		*	1.25	
4. Value added	3.8	2.82		2.55	3.09	
6. % share of retail price to producer	80			87		

- For producer, cost per liter produced, not estimated due to absence of data at baseline.
* Profit margin at producer level could not be estimated due to absence of cost of production data at baseline; previous ILRI study estimated returns to labor at 3 rupees per liter (ILRI 2007).

Estimates of sector* level economic benefits

Estimate of milk sold traders in Guwahati	
Total no. of traders (expert opinion)	550
Average quantity /day (from survey data)	202
Total liters/day (accounting for 75% of total milk traded)	111,100
Projected to 100% (liters)	148,133
Value added (rupees)/day	835,472
Annual VA (USD at 54 USD = 1 INR)	5,647,172

*These are preliminary estimates.

Food safety-associated outcomes

- ✓ Improved milk handling practices by milk vendors and producers.
- ✓ Increased incidence of reported satisfaction with milk quality (e.g., longer shelf life/lower spoilage rate, absence of odor)
- ✓ Higher levels of water in milk samples tested indicative of adulteration; absence of other adulterants, e.g., chemical.
- ✓ Microbial quality observed to vary widely, suggesting contamination during milking or post milking caused by poor handling and/or dirty utensils and surrounding.

Conclusions and implications

✓ Training has positive economic benefit to milk traders (higher average margins relative to all traders in exposed site, and traders in control site).

✓ Milk traders with training generate average profit margins of 0.62 rupees/liter of milk sold in control site and 1.25 rupees/liter of milk sold in exposed site; incentives to training.

✓ Relative shares of producer and trader prices in milk retail prices, on average, also suggest that the market for traditional dairy is efficient in sites that were covered by the study.

✓ Value added estimates from traditional dairy value chain are 6.62 rupees/liter in control site, and 5.64 rupees/liter in exposed site => economic incentives from traditional dairy

✓ At about 0.8 million rupees value added generated per day in traditional dairy value chain, annual estimate of economic impact in Kamrup is at least US$ 5.6 million => potential for pro-poor development

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