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How Will Training Traders Contribute to Improved Food Safety in Informal Markets for Meat and Milk?

A Theory of Change Analysis

Nancy Johnson

John Mayne

Delia Grace

Amanda Wyatt

CGIAR Research Program on Agriculture for Nutrition and Health

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AUTHORS

Nancy Johnson (n.johnson@cgiar.org) is a senior research fellow for the CGIAR Research Program on Agriculture for Nutrition and Health, at the International Food Policy Research Institute (IFPRI), St. Paul, MN, US.

John Mayne is an independent advisor on Public-Sector Performance, Ottawa, Canada.

Delia Grace is program leader of Food Safety and Zoonosis at the International Livestock Research Institute, Nairobi, Kenya.

Amanda Wyatt is a program leader for the CGIAR Research Program on Agriculture for Nutrition and Health at IFPRI, Washington, DC.

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ABSTRACT

Increased consumption of meat, milk, eggs, and fish among poor consumers in developing countries has the potential to improve nutrition as well as drive pro-poor economic development. However, animal-source foods are a major source of food-borne disease. In addition to the health impacts, concerns about food safety can reduce consumption of nutritious foods and reduce market access for smallholders. Researchers from the International Livestock Research Institute and partners have developed and piloted an institutional innovation—a training, certification, and branding scheme for informal value chain actors—that has the potential to improve the safety of animal-source foods sold in informal markets. To support further research and, eventually, delivery at scale, this paper develops a theory of change for how the intervention is expected to contribute to better nutrition and health outcomes for consumers. The outcomes along the pathway from intervention to impact are identified, along with the underlying causal assumptions. For each assumption, the existing evidence is summarized and assessed. The results show that for some parts of the impact pathway, outcomes and causal links are well defined and supported by evidence, while for others, the program logic needs to be refined and more evidence gathered to validate hypothesized causal relationships in specific contexts. Addressing these gaps through research and through piloting interventions with development partners can increase the likelihood of achieving expected outcomes and contribute to learning about how to improve the performance of informal markets in developing countries.

Keywords: food safety, informal markets, training, certification, dairy

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1. INTRODUCTION

While globally there are serious concerns about the impacts of overconsumption of animal products on human health and the environment, in developing countries increasing consumption of animal-source foods (ASF) among poor consumers has the potential to improve nutrition as well as drive pro-poor economic development (Murphy and Allen 2003; Neumann et al. 2003; Food and Agriculture Organization of the United Nations [FAO] 2009; Kavle et al. 2015). Most consumers and producers, especially but not exclusively the poor, buy and sell meat, milk, and fish in informal markets made up of small-scale, unregulated market actors, a situation that is likely to continue for some time (Grace, Randolph et al. 2008; Vorley 2013). Past development policy often focused on formal markets, which at best meant neglect of informal markets and often resulted in harassment and penalties for informal agents (Omore and Baker 2011). While in the long term markets are likely to formalize, in the short term, interventions that seek to suppress informal markets can be both ineffective and antipoor (Chenevix Trench et al. 2011; Leksmono et al. 2006; Vorley 2013). Recent evidence suggests that a more constructive, incentive-based approach to informal markets could improve their contribution to economic development as well as increase compliance with standards in areas such as the environment, public health, and labor (Roesel and Grace 2015).

There is a growing recognition of the importance of food safety in developing countries. Forthcoming work by the World Health Organization Foodborne Diseases Burden Epidemiology Reference Group estimates that around 25 percent of all diarrhea is food borne. As diarrhea is usually among the top three infectious diseases in developing countries, this represents an enormous health burden. Most food-borne disease is associated with ASF and produce (Adak et al. 2005; Grace, Mutua et al. 2012; Lynch et al. 2006).

In developed countries, food safety is generally managed by regulation, and increasingly private-sector standards are in advance of the public sector. In contrast, developing country food systems are characterized by a majority of informal-sector actors that are difficult to monitor and a few large companies that have incentives to escape or capture regulation. These structural challenges are compounded by generally poor capacity to enforce regulation in many developing countries. In regard to food system regulation, stakeholders cite the following governance challenges: inadequate policy and legislation; multiple organizations with overlapping mandates; outdated, fragmented, or missing legislation; inappropriate standards; lack of harmonization and alignment of standards; failure to cover the informal sector; limited civil society involvement; and limited enforcement (FAO 2005).

As a result, in developing countries government systems to support food safety are often still emerging, and consumers' choices may be limited by income and information, which means that the most important incentives to safe production—private demand and effective private or public regulation—are lacking. New approaches to food safety that support and are supported by a range of incentives—social, market, or regulatory based—need to be developed to encourage farmers and other value chain actors to produce quality and safe products. Because of the high level of involvement of the poor and women in producing for, and selling in, informal markets, agricultural research and development interventions that aim to improve their livelihoods have engaged with these informal markets (Chenevix Trench et al. 2011; Grace, Randolph et al. 2008; Vorley 2013). But in comparison to either smallholder producers or formal-sector food chains, informal markets have received little attention in programs or policy.

This paper looks at the potential of one type of institutional innovation—a training, certification, and branding (TCB) scheme for traders—to contribute to improved food safety outcomes in informal markets for ASF. Evidence from risk analyses and other studies of livestock value chains have found that actors whose roles include aggregating product from many producers—for example, traders, processors, chilling plants, slaughterhouses—play a key role in maintaining and improving the quality of food, and they also may be easier to reach since there are fewer of them compared to either producers or consumers (Grace et al. 2012; Kouamé-Sina et al. 2012; Kumar and Staal 2010; Makita et al. 2010). The intervention, which emerged from research on smallholder dairy production and marketing in Kenya, has

been adapted for milk traders in India and Tanzania and butchers in Nigeria. It is based on the hypothesis that professionalizing rather than criminalizing informal-market actors improves food safety outcomes while at the same time improving nutrition and protecting and enhancing important sources of income and employment for the poor. The approach also may be applicable to formal-sector actors who are currently unable to ensure food safety.

Building on the experiences of the pilot studies, this paper develops the theory of change (ToC) that explains how the intervention is expected to work and identifies the assumptions that underlie its successful implementation. Evidence from research and experience are used to assess the plausibility of the intervention and identify issues and gaps for future research and for monitoring. The goal of the analysis is to improve the impact orientation of research and the likelihood of success of interventions. It complements work using theory-based approaches to evaluate value chain interventions (for example, Ton, Vellema, and Ge 2014), in particular in terms of spelling out the linkages between agricultural interventions and improvements in health and nutrition outcomes.

The paper is organized as follows. Section 2 describes the origin of the TCB intervention and its application in pilot sites. Section 3 provides a general introduction to ToC and its use in Agriculture for Nutrition and Health (A4NH). Section 4 develops ToC for trader-based interventions. Section 5 summarizes and concludes.

2. A TRADER-BASED INTERVENTION TO IMPROVE FOOD SAFETY IN INFORMAL MARKETS FOR ANIMAL SOURCE FOODS: FOUR EXAMPLES

Prior to the late 1990s, most livestock research in developing counties did not benefit the poor (LID 1999). To improve the impact of livestock research on poverty, the International Livestock Research Institute (ILRI) began to work on informal markets initially for dairy and later for meat and other animal products (Roesel and Grace 2015). The Smallholder Dairy Development Program (SDDP) (1997–2005) focused on improving productivity and profitability of dairy production and marketing among smallholders in Kenya. The program found that the policy banning informal milk markets was acting as a barrier to the uptake of improved technologies among producers and traders. Researchers worked with other stakeholders to document the negative impacts of the existing policy and propose an alternative. The eventual result of the research coupled with an extensive policy engagement strategy by dairy-sector stakeholders was a new policy in which small-scale milk vendors were officially recognized by the governing and regulatory bodies in Kenya in 2004 (Leksmono et al. 2006; CGIAR Science Council 2008).

A key issue in the policy debate was milk safety. The justification for the previous policy was the assumption that the raw, or unpasteurized, milk sold by the small-scale traders who collected milk from farmers and sold it door to door or in small kiosks known as milk bars was unsafe. Pasteurization has been considered one of the most important breakthroughs in public health. Health officials strongly supported the formal market, which sold pasteurized or ultra-heat-treated milk. However, research showed that the quality of dairy products in informal markets was not any worse than that in formal markets because milk safety compliance was poor in both markets. Research suggested that improvements could be made through investments in training milk traders (Omore and Baker 2011). Lack of knowledge and awareness about hygienic milk handling and quality control among traders was identified as a barrier to milk safety. A market-level study conducted by SDDP found that only 12 percent of raw milk handlers reported having ever received any form of training in hygienic milk handling and quality control. Up to 43 percent of dairy cooperative workers reported having received some training, compared to only 4 percent of mobile milk traders (Omore et al. 2005). The project developed a plan for training traders on hygienic milk-handling operations and using simple testing methods to assess the quality of raw milk before purchasing it from farmers. Using participatory techniques, researchers worked with traders to develop improved metal milk containers that could be carried on bicycles. In the past, informal traders were reluctant to invest in improved containers since there was a high risk that they would be confiscated by authorities.

Since the 2004 policy change, the Kenya Dairy Board (KDB) has been training and licensing traders who complete the training, for which traders pay a fee (CGIAR Science Council 2008). The training is a key component of a broader quality assurance strategy that also includes accreditation of business development services (BDS) and regulations that recognize the legitimacy of trained traders. Selected BDS providers were accredited by a committee and assisted to provide training in milk hygiene and other areas. BDS were authorized to issue certificates of competence and required to report to the regulatory authority, KDB. KDB was charged with monitoring compliance of accredited BDS providers. A survey of milk traders in the SDDP pilot areas in 2007 found that 85 percent of respondents had been trained and that around half reported applying for and receiving licenses (Kaitibie et al. 2010). In 2009, around 4,000 traders (15 percent of the estimated traders) were registered (Department for International Development (DFID) and ILRI 2011). An assessment of the current status and impacts of the KDB scheme is under way, led by international Institute for Environment and Development (IIED).

The Training and Certification approach that was developed and used in Kenya has been adapted and tested in three other contexts, two for dairy (India, Tanzania) and one for meat (Nigeria). The inclusion of explicit branding activities was a part of some of the adaptations, the details of which are provided in Table 2.1. In two of the three cases, evaluations documented that participating value chain actors increased their knowledge and skills and improved their food-handling practices. In some cases,

better milk quality and higher incomes were found (Lapar et al. 2014b) and significant economic benefits generated (Kaitibie et al. 2010). In the Nigeria case, the intervention could be plausibly linked with reduction in diarrhea and savings in reduced health care expenditure worth many times the cost of training butchers (Grace et al. 2012). The experiences led to the hypothesis that there is an opportunity to professionalize traders, making them more

- stable and profitable business managers,
- respectable and trusted by consumers,
- accepted by governments as an important and recognized sector, and thus
- empowered and incentivized to provide safe food.

Table 2.1 Key characteristics of the trader training pilots

Characteristic	Kenya	Assam, India	Mwanza and Arusha, Tanzania[a]	Ibadan, Nigeria (Grace et al. 2012)
Project period and details	1997–2006 with training pilots conducted in 2002, DFID funded	2009–2013, funding from DFID, OFID, A4NH, and others including local government	2012–2016 (ongoing) in More Milk IT project sites funded by Irish Aid, promoted by Tanzania Dairy Board	2009, Bodija Market, funded by CAPRi and others
Initial situation	Large dairy sector, high consumption (140 kilograms/capita/year); informal market was illegal but accounted for 86% of milk sales (Omore and Baker 2011); milk safety used to justify suppression of informal sector but quality not lower than in formal sector	Underdeveloped milk sector, per capita availability 70 grams/day; consumption mainly in tea and sweets; informal sector is 97% of market; not illegal but not supported; quality of milk in informal sector is poor, but consumers prefer it for convenience	Dairy sector underdeveloped and average consumption low (24 -39 liters/person/year1); regulatory framework permits informal sector to operate after training and certification; dealers in milk and milk products must register with the Tanzania Dairy Board	Major market in the third largest city in Nigeria, conditions in the abattoir and market were poor, widespread public and media concerns about food safety and environmental pollution
Policy context and engagement	A coordinated campaign for policy change, based in part on research results, led to a policy change in 2004 that decriminalized the informal sector in 2004 (Leksmono et al. 2006)	Explicit engagement with policy actors from municipality and from food safety agency with objective to change attitudes; project fostered interaction between traders, producers, and government; government agents agreed to suspend fees during the project period and to support the scheme	Research evidence used in establishing the Tanzania Dairy Board, a semiautonomous institution, established by the Dairy Industry Act Cap 262 (2004) to regulate and promote the growth of the industry under the Ministry of Livestock and Fisheries Development	No but local officials were engaged and invited to participate

[1] "While the latest FAOSTAT indicates per-capita milk consumption in Tanzania has remained unchanged at about 24 litres over the past decade, national sources in Tanzania estimate that milk availability/consumption has increased significantly to about 39 litres per capita annually. The source of the difference is in estimates of annual production." (ILRI et al 2011, 170).

Table 2.1 Continued

Characteristic	Kenya	Assam, India	Mwanza and Arusha, Tanzania[a]	Ibadan, Nigeria (Grace et al. 2012)
Details of pilot scheme involving traders	Three parts: training course for traders with fee, accreditation of BDS providers to implement trainings and issue certificates, Kenya Dairy Board (regulatory authority) monitoring of BDS providers and informal traders; branding was not an explicit part of the intervention, but trainees could be recognized by their use of white coats and boots; in 2009, 4,000 traders registered nationally	Training of "elite" traders, without fee, by government; traders monitored for six months as follow up and to ensure compliance; municipal government gives a business license after monitoring successfully completed2; 265 producers trained to date; 480 farmers trained; branding component was dropped due to funding cuts, but media coverage of project activities did reach consumers; anecdotal evidence suggested that trained traders wore masks, gloves, aprons, and so forth to convince consumers about quality	Similar to Kenya model but service providers not assessed by Tanzania Dairy Board; 100 traders trained to date	An interactive training workshop was held for Butchers Associations' representatives (68 participants from 22 associations); participants were provided with materials; branding featured strongly with aprons, caps, and visible slogans and training attendance certificates
Outcomes documented	Change in trader practices, milk quality, and profitability (Omore and Baker 2011); economywide impact of policy change estimated at (US$28 million/year) (Kaitibie et al. 2008; Kaitibie et al. 2010)	Changes in practices and milk quality among trainees observed (Lindahl et al. 2014); economic benefits reported (Lapar et al. 2014b)	None to date	Knowledge sharing; improvements in knowledge, attitude, and practice in key food safety aspect; microbiological quality of meat sold also significantly improved after the intervention
Sustainability	Training and certification scheme is still running	Training being implemented in other towns and districts by government and though a World Bank project	Will be replicated in more sites in Tanzania as part of another project	

Source: Authors.

Note: DFID = Department for International Development; OFID =OPEC Fund for International Development; A4NH = Agriculture for Nutrition and Health; CAPRi = Collective Action and Property Rights; FAO = Food and Agriculture Organization of the United Nations; BDS = business development services. [a.] See https://cgspace.cgiar.org/bitstream/handle/10568/34850/moreMilkIt_brochure.pdf?sequence=1.

[2] The awarding of the certificates was covered in a local newspaper: http://www.telegraphindia.com/1150720/jsp/northeast/story_32586.jsp#.Vazic4zD_IV.

The approach for achieving the objectives involves an appropriate mixture of

- training traders or other value chain actors;
- forms of certification of traders, recognition by authorities, or both; and
- branding or other ways of signaling food quality, including safety, to consumers.

It is important to point out, in addition to these three components of the intervention, that the projects that implemented the TCB pilots also worked to build or strengthen networks between governments, researchers, and traders in the pilot sites. Interactions with traders often occurred through their associations, where they existed, and strengthening these associations was an important objective of the interventions. The emphasis on embedding the TCB intervention within a broader program of institutional strengthening and relationship building reflects the important role of an enabling environment for the successful and sustainable implementation of the TCB intervention. Policymakers in developing countries often are focused on formalizing markets and complying with international standards. As a result attracting their interest in and support for an initiative focused on informal markets can be a challenge. As in the case of Kenya, policy engagement and ultimately policy change was needed before the pilot scheme could be implemented. In other cases, close links with government are expected to be important to the intervention's sustainability (for example, India).

The TCB approach, with its focus on incentives for improving practices along the value chain, is also expected to complement ongoing work on other market-based approaches such as linking trained/certified actors to premium markets that recognize and reward quality and safety and research on improved technologies in the areas of rapid diagnostics, improving safety, and reducing waste.

3. USE OF THEORY OF CHANGE IN CGIAR

ToCs and related impact pathways have become important tools in development aid in general and in CGIAR reform efforts in particular. There are several reasons for this. With the significant focus in CGIAR on making a difference in the development agenda, there is a need for CGIAR Research Programs (CRPs) to articulate how their research efforts are expected to contribute to development impacts. They need to understand their pathways to impact and the models or ToCs behind the pathways. While in some cases researchers and partners have clearly identified these pathways, it is often the case that the process of developing ToCs reveals inconsistencies in the logic, information and capacity gaps, or importance of previously unrecognized actors. As their research progresses, CRPs will need to be able to show progress in building robust, credible ToCs and, as research outputs become available, monitor their uptake and use. In many cases, CRPs will need to use theory-based approaches to evaluating their impact (Mayne and Stern 2013; UNEG Taskforce on Gender Equality and Human Rights 2013; White 2009), for which ToCs are essential.

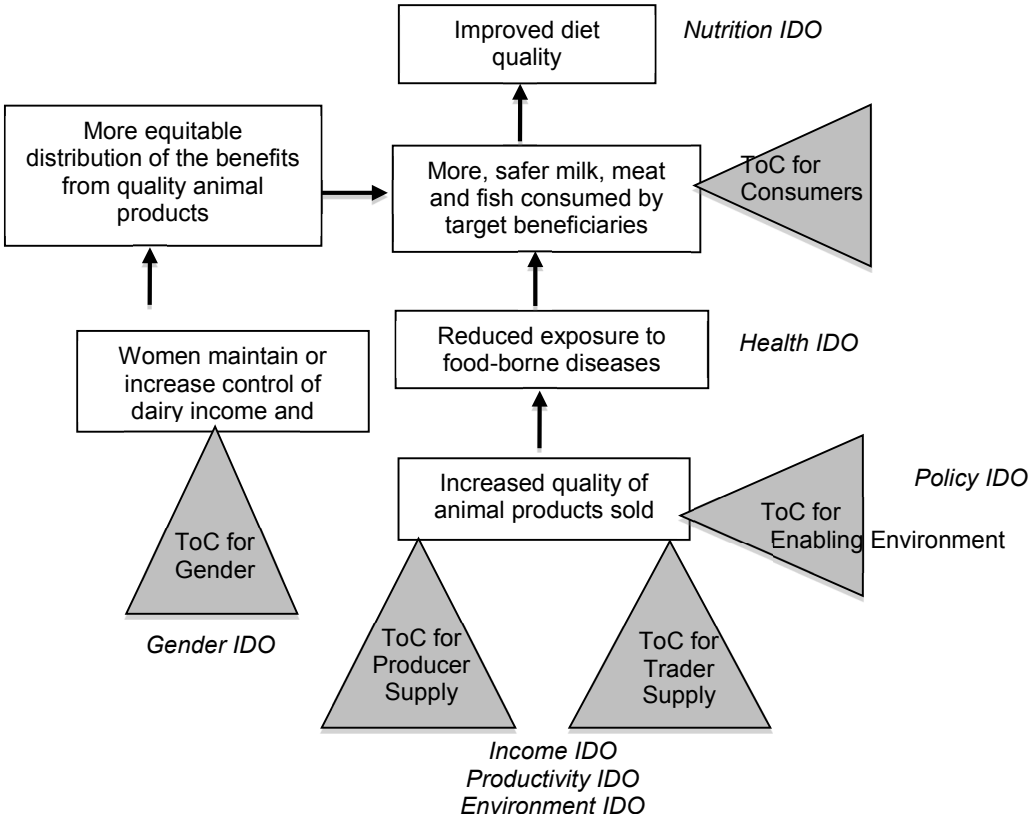
In CGIAR, research on food safety in livestock value chains is conducted by two CRPs, the CRP on livestock and fish (L&F) (http://livestockfish.cgiar.org/) and the CRP on A4NH (www.a4nh.cgiar.org). Figure 3.1 shows an overall ToC for improving nutrition and health in value chains with an illustrative impact pathway and several nested ToCs (the triangles) that reflect the multiple objectives—known as intermediate development outcomes in CGIAR—of L&F and where food safety fits. In the broadest sense, improving the quality of animal products sold reduces the consumer's exposure to food-borne diseases. Better-quality ASF and greater access to them are expected to lead to improved diet quality for nutritionally vulnerable individuals, such as women, their children, and the poor. The *rationale assumption* for this overview ToC is the following:

> *IF safer food products can be made available and IF the benefits from consuming safe and nutritious food can be more widely and equitably distributed THEN improved diets will result for women and children.*

This paper focuses on a ToC for traders in informal ASF markets (lower right of Figure 3.1). However, it is important to recognize that this ToC is part of a broader research for development effort to improve nutrition and health and reduce poverty and environmental degradation in regions where livestock play an important role in smallholder production systems. L&F is in the process of developing additional ToCs to guide the broader program.[3]

[3] See http://livestockfish.cgiar.org/2015/02/17/monitoring-evaluation-process/.

Figure 3.1Overview of ToC for improving nutrition and health in livestock value



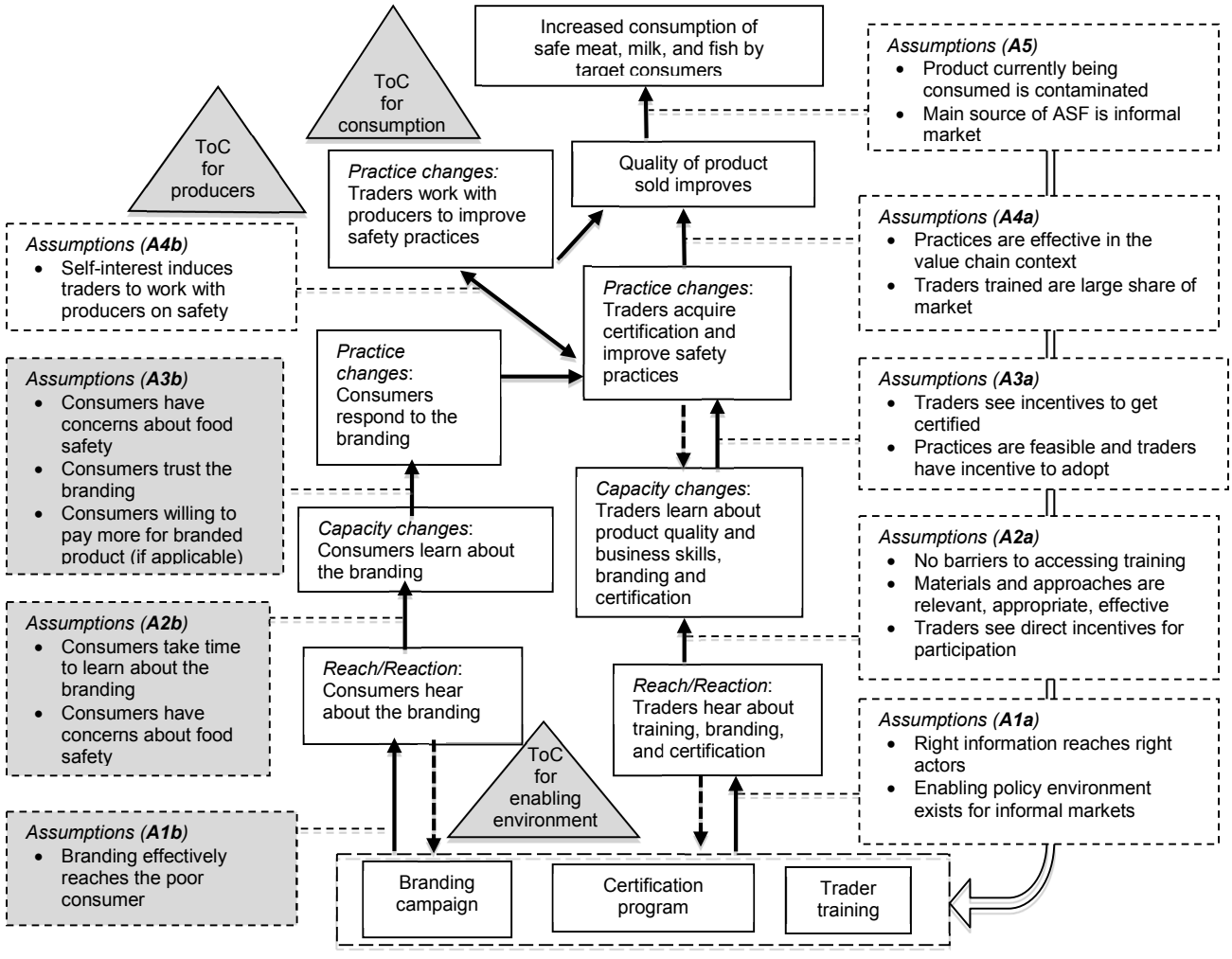
Source: Authors.
Note: IDO = intermediate development outcome; ToC = theory of change.

4. A THEORY OF CHANGE FOR A TRADER-BASED INTERVENTION IN INFORMAL VALUE CHAINS

An initial draft of this ToC was created by the authors based on project documents and on the outputs from participatory ToC workshops in the L&F sites in Tanzania (Kidoido and Korir 2013a), Uganda (Kidoido and Korir 2013b), and Vietnam (ILRI 2013) in 2013. The draft, based on activities in Tanzania, was circulated and presented to participants from A4NH and L&F in a two-day workshop in February 2014. The document was substantially revised based on inputs from the workshop.

Figure 4.1 is a generic ToC for the TCB intervention.[4] The generic intervention uses an appropriate combination of TCB, targeted toward traders, to bring about the consumption of safer food products and to contribute to improved productivity, income, and nutrition objectives.

Figure 4.1 Generic ToC for the training, certification, and branding program



Source: Authors.

Note: ToC = theory of change; ASF = animal-source foods. The assumptions in the trader ToC that would be outcomes in the consumer ToC are highlighted in grey and would include consumer capacity and behavior changes in relation to food safety and to consumption of ASF in general.

[4] The basic type of generic theory of change (ToC) being used here is discussed by Mayne (2015). It uses an impact pathway from reach through changes in capacity and practice to changes in direct benefits and to improvements in well-being. For each link in the ToC there are causal link assumptions noting which events and conditions are needed for the causal link to work.

The generic TCB programs are the research outputs. Their collective implementation is referred to here as *the intervention,* the implementation of which would involve actions by a number of actors, such as agriculture researchers, governments, private-sector organizations, and nongovernmental organizations. The intent of this generic ToC (Figure 4.1) is to assist in the development of effective food safety interventions by supporting learning about how the intervention works, under what conditions, and how it can be improved. The large number of assumptions behind such interventions is discussed below. The blue arrows from the assumptions back to the research outputs indicate that the questions the assumptions raised would form the basis for researchable issues that need addressing to design the specific elements of such interventions.

Since the purpose of this analysis is to test the overall logic and plausibility of the intervention and its potential to contribute to health and nutrition outcomes, we start at the end of the impact pathway (the top box in Figure 4.1) and work down, examining the outcomes and the assumptions that underlie the links between them. Available evidence on the assumptions is summarized and assessed using the scale in Table 4.1. Based on the results, the likelihood of the outcomes' occurring is also assessed (Table 4.2).

Table 4.1 Categories applied for assessing the strength of the evidence on assumptions

Category	Definition
Strong	On the basis of available evidence, it is likely that the assumption(s) will hold.
Medium	The available evidence is consistent with the assumption's holding, but the evidence is incomplete.
Weak	The evidence suggests that the assumption is unlikely to hold or there is no available evidence to support the assumption.

Source: Authors.

Table 4.2 Categories for assessing the likelihood of outcomes along the impact pathway

Category	Definition
High	The outcome is plausible, and the evidence for the assumption(s) is generally strong.
Medium	The outcome is plausible, but the evidence for the assumption(s) is of medium strength.
Low	The outcome is not plausible, the evidence for the assumption(s) is weak, or both.

Source: Authors.

Will Improvement of the Quality of Product Sold Increase Consumption of Safe Meat, Milk, and Fish?

The L&F CRP estimates that it will reach 985.6 thousand households (4.5 million individuals) by 2023 in its target value chains in its countries (dairy in Tanzania and India, small ruminants in Ethiopia and Burkina Faso, fish in Egypt and Bangladesh, pork in Uganda and Vietnam, and dual-purpose cattle in Nicaragua). The expected increases in consumption of meat, milk, fish, and other ASF will increase dietary diversity scores by one food group, leading to a significant increase in the share of women and children above minimum diversity thresholds. As a result of consuming safer ASF, L&F estimates that exposure to food-borne disease will be reduced by 5 percent.[5]

An improvement in the quality of the product sold in the informal market is likely to lead to an improvement in quality of product consumed as long as the product that consumers were consuming before was of poor quality (box A5 in Figure 4.1). There is also an implicit assumption that a meaningful share of the meat, milk, and fish consumed by poor and undernourished people in target areas comes from the informal market. The evidence for these assumptions is presented below.

[5] The source for these estimates is Michael Kidoido, International Livestock Research Institute.

Current Safety of Meat, Milk, and Fish Consumed by Poor Households is Low

While health surveillance systems in developing countries rarely include food-borne disease, hazard and risk assessments in a variety of informal markets in East Africa (milk: Desissa et al. 2013; Grace, Randolph et al. 2008; Kilango et al. 2012; Shija et al. 2013), West Africa (milk: Kouamé-Sina et al. 2012), Vietnam (pork: Nguyen-Viet et al. 2013; ILRI 2010), and India (milk: Grace, Lapar, and Deka 2011; and pork: Fahrion et al. 2013) find high levels of contamination in food sold in informal markets (and often in formal markets as well).

Whether the presence of hazards in the value chains translates into a risk to human health may depend on household food-handling practices. Several studies have shown that boiling milk purchased from the informal sector is a common and effective way to reduce risk of infectious disease from milk (Grace et al. 2008; Kouamé-Sina et al. 2012; Makita et al. 2010; Omore et al. 2005). However, in India and Africa a significant amount of milk is fermented before drinking, which is less effective at removing pathogens than is boiling. In the case of pork purchased from informal markets in Vietnam, the majority of surveyed households reported health-mitigating practices: 100 percent of respondents cooked pork within three hours of purchase, and 98 percent reported cooking pork for at least ten minutes (Lapar et al. 2014a). Results from the study suggested that vegetables could be a greater source of gastrointestinal illness than are ASF (Lapar et al. 2014a). However, cross-contamination within households was also a risk, as consumers did not separate meat and vegetables.

Where market-based food safety interventions such as TCB address the same risks that consumers are already effectively managing through food-handling practices, reduction in exposure to food-borne diseases is likely to be small. It is important to point out that there could be an economic benefit to consumers if they no longer have to pay the financial and time costs of mitigation practices. This could be particularly important to women, who often have responsibility for food preparation and face time and cash constraints. Where household risk-mitigating practices can't address all relevant food safety issues, then an improvement in the quality of product sold would be expected to result in an improvement in quality of product consumed.

Often, a subpopulation (determined by cultural practices, gender, wealth, and age) bears the majority of the risk, and interventions targeted to this subpopulation will bring the most public health benefits. For example, there is evidence that traders and their families are at high risk from food-borne disease because of their habits of consuming unsold food and sometimes tasting raw food to convince customers of its wholesomeness. Other high-risk groups are some pastoralist groups that believe milk is intrinsically pure and do not heat it, men who consume meat in pubs and eateries, and pregnant women and infants who are biologically vulnerable to pathogens.

It is also important to keep in mind that demand for meat, milk, and fish is expected to grow in developing countries (Robinson and Pozzi 2011). Some of this may be from increased consumption by current consumers, but much of it will result from new markets' reaching new consumers. In Tanzania, for example, current per capita milk consumption is only 42 kilograms per person per year compared to 120 for Kenya (www.africa.com/blog/dairy-consumption-in-africa-part-1/). An important question will be whether consumers who are new to markets and may not have experience with storage and preparation of meat, milk, and fish will undertake mitigation practices with the same frequency and the same effectiveness. Interventions have been targeted at training urban consumers to improve milk hygiene practices (Kang'ethe et al. 2012). Where markets are expanding rapidly, an increase in exposure to food-borne disease might be expected. The absence of an increase (rather than a decrease) would be a sign of successful food safety interventions.

Status of the Evidence on this Assumption: Medium to High

The burden of food-borne disease is clearly large; however, in some cases, consumers are already undertaking risk-mitigating practices that address common food safety concerns. More information is needed to identify which risks are not currently being mitigated and what the gender-disaggregated costs of current mitigation practices are. Where consumption is currently low and where markets are expanding, more research is needed to understand whether use of mitigation practices will be the same as in populations that currently consume meat, milk, and fish and what implications this has for the potential health benefits from the proposed intervention (including in the form of losses averted).

Share of Meat, Milk, and Fish Accessed in Markets is High

Value chains, especially traditional, informal markets, are the main source of meat, milk, and fish for consumers in developing countries and are especially important for the poor (Jayne 2007; Hawkes and Ruel 2012). In east and central Africa informal markets currently supply 85–95 percent of market demand and will still supply 50–70 percent of market demand by 2040 (Tschirley et al. 2015). In Vietnam, 97 percent of pork is sold in traditional wet markets (Tisdell et al. 2010), and in Malaysia, where supermarkets are commonplace, traditional markets remain the preferred place for buying fresh meat (Chamhuri and Batt 2013). In the Assam state in India, 66 percent of milk produced goes directly to consumers, 31 percent to traders, and 3 percent to the formal sector (Staal et al. 2007). In Kenya, 42 percent of milk produced goes directly to consumers, 32 percent to traders, and 24 percent to cooperatives. Data suggest that for meat commercially slaughtered in Nigeria, 60 percent goes to traders, 25 percent goes to butcher shops, 10 percent is sold at point of slaughter, and 5 percent goes to supermarkets (ILRI 2011).

Status of the Evidence: Strong

Markets are currently important sources of meat, milk, and fish for poor consumers and will likely grow over time as own consumption or purchase directly from producers declines. Informal markets may become less important relative to formal markets over time; however, they will continue to be important in the short to medium term.

- ***Likelihood that an improvement in the quality of product sold will lead to increased consumption of safe meat, milk, and fish: High.***

Will Change in Trader Practice Lead to Improved Quality of Product Sold?

If traders receive training, adopt risk-minimizing practices, and get certified, the quality of the product sold on the market is likely to improve as long as the practices are effective (box A4a in Figure 4.1). There is also an implicit assumption that the output from trained traders will account for a significant share of the product on the market.

In some cases it may also be in traders' self-interest (box A4b in Figure 4.1) to try to influence practices of producers where this is an important source of food safety hazards (Kumar and Staal 2010). Presumably most of the product would be marketed through the traders, but there could also be spillovers either through home consumption by farm households or through other sales channels. Efforts to improve food quality could increase the quantity produced or reduce costs for farmers, issues that would need to be explored through a separate ToC for producers.

Practices are Effective

In the pilot studies, the practices promoted in the trainings were selected based on the findings of value chain risk assessments. Evidence from three pilot studies showed that adoption of practices by traders resulted in improvements in product quality and safety in Kenya (Omore et al 2005), India (Lapar et al. 2014b; Lindahl et al. 2013), and Nigeria (Grace et al. 2012). Over time, however, changes in value chains such as the type of products sold and the type of technologies used by producers and consumers could influence (positively or negatively) the effectiveness of the practices taught in the trainings and the food safety context in general. To the extent that trainings can focus on principles rather than practices associated with specific products and technologies they might be more useful in a changing context. Previous research suggested that moving from the complex and lengthy processes typical of Good Manufacturing Practice and Hazard Analysis and Critical Control Points systems to few, simple messages was key to bringing change. In the Nigeria case, the training focused on four key food safety messages, supplemented with materials to support hygienic practices (Grace et al. 2012).

Status of the Evidence: Strong

However, it needs monitoring to see whether effectiveness is maintained over time.

Traders Trained are a Large Share of the Market

For the trained traders to have an impact on the quality of the product sold in markets, they will have to account for a significant share of the market. Working through trader associations helps to ensure that a large number are reached. In the Assam pilot, nearly all the milk traders participated in the intervention. In Nigeria, more than 70 percent of the butchers in the Bodija market, the main market center in Ibadan for livestock slaughter, processing, and marketing, were trained.

The share of the market supplied by trained traders will depend not only on how many are trained but on what happens to the trainees. Omore et al. (2002), however, found that there is high turnover among milk traders in Kenya, the implications of which need to be better understood. Rapid turnover could reduce traders' incentives to invest in training; however, it could also ensure a large pool of trainees, which would be good for the business model. In places such as Assam or Mali, milk trading is a cultural and family occupation with less turnover of operators (Roesel and Grace 2015).

Status of the Evidence: Medium to Strong

Pilots have successfully reached a large share of their target participants, which suggests that the quality of milk supply will be improved. A good understanding of trader dynamics and the determinants of trader turnover will be important to the long-term success of trader-based schemes.

- ***Likelihood that changes in trader practices will lead to better quality product on the market: Medium to high.***
  There is evidence that changes in trader practices result in better product quality; however, whether this translates to better product on the market, over time and at scale, will depend on market characteristics and is something that needs more research.

Will Change in Knowledge, Attitude, and Skills Lead to Changes in Practice?

Initiatives aimed at training informal value chain actors are reported to be successful (von Holy and Makhoane 2006; Donkor et al. 2009; Campbell 2011). A meta-analysis of interventions to train food handlers found trained handlers had around 30 percent improvement in knowledge over controls ($n = 9$ studies) and 70 percent improvement in practices, but this was based on self-reported practices, which are prone to exaggeration (Soon, Baines, and Seaman 2012). In the TCB pilots, high levels of adoption of practices were found in all cases (Table 4.1). At least in some cases, the costs of the activities were borne

by the projects, so it will be important to assess whether traders continue to undertake these expenses, such as special clothing or banners, when they need to bear the costs themselves.

For traders to change their behavior, the safety practices need to be feasible to traders (box A3a in Figure 4.1). Furthermore, the training and certification have to be well coordinated, and the incentives for taking the extra step for certification, where required, have to be in place. The branding campaign is intended to get poor consumers to seek out and demand safe, branded food product. This they will likely do if they have concerns about food safety and if they trust the branding program and the training and certification activities on which it is based (box A3b in Figure 4.1. These types of reactions by consumers would further sensitize traders to food safety and incentivize them to change their practices. Details of consumers' reactions to the branding campaign (as described in boxes A1b–A2b in Figure 4.1 would be described and assessed in a consumer ToC and have not been well documented in the pilots to date. As a result, they are not described in detail in this paper and remain important for future research and piloting.

Practices are Feasible and Generate Benefits to Traders

Where certification can be meaningfully linked to changes in practice, then changes in practice would be expected to follow certification. Where certification is linked to training, as was the case in two of the pilots, the incentive to actually change practice—as opposed to just attend training and get certified to avoid harassment or to attract customers—would come from being able to capture an economic benefit from doing so. While a price premium for safety may not be feasible or appropriate (Russo, Perito, and di Fonzo 2011), and was not observed in the pilots, in all of the pilots there was evidence of economic benefit to the traders. In Kenya, in addition to the reduction in transaction costs due to reduction in harassment, Leksmono et al. (2006) found that certified small-scale milk vendors (SSMVs) reported higher incomes due to less milk spoilage. In an assessment of the training and certification scheme in Assam (Northeast India), Lapar et al. (2014b) found that milk traders generated average profit margins of 0.62 rupees per liter of milk sold in control sites compared to 1.25 rupees per liter of milk sold in the project site. Training schemes include business management skills, which are, in and of themselves, a benefit to traders but could also have the added value of making it easier for them to see the economic benefits they get from adopting improved practices.

In the pilots, some or all of the costs of adoption of practices may have been covered by the project. In the Nigeria butcher case, for example, the materials necessary to adopt practices (stall banner, netting to protect meat from flies and other pests, boots and aprons, hand soap, and disinfectant) were given without charge with an assumption that butchers would meet the costs of replacement. Follow-up is needed to see whether this actually happens. Leksmono et al. note that "in the longer term, the license and cess [tax] fees involved may be a disincentive for some traders, when they weigh up the benefits of complying with regulations against the risk of paying fines or bribes if caught unlicensed" (2006, 34).

Status of the Evidence: Medium

There is strong evidence from pilots of adoption and some indication that practices generate benefits to traders. More rigorous documentation of benefits is needed along with evidence that they can be sustained in the long term in the absence of project support.

Traders have Incentives to Get Certified

Traders may face a range of incentives for certification. In a context such as Kenya where certification is a legal requirement for doing business, there is a clear economic incentive for traders to get certified. While it may not permit producers to charge a higher price, certification can bring other benefits such as social status, government recognition, and possible access to programs. Where there are no obvious individual economic rewards associated with certification, as opposed to practice change, then the incentive for fraud would decline.

The benefits of certification need to be weighed against the costs, including time and administrative costs of the process, and potential costs of being part of the formal sector, for example, in the form of taxes. Costs could be a barrier to certification for some value chain actors such as women or the poor.

Benefits of certification are not only for the traders. The government also has an incentive to certify as a step toward formalizing the sector. Where this is a goal of certification, different types of incentive structures where costs are shared between public and private sectors might be appropriate.

Status of the Evidence: Weak to Medium

The benefits and costs associated with certification, individually and socially, would appear to be quite context specific, and more information is needed about how they might evolve over time. The absence of a clear link between certification and the ability to charge a higher price could alleviate some of the challenges of certification in contexts where there is low trust in monitoring and enforcement systems.

Consumer Concerns about Food Safety

There are few nationally representative surveys of food safety perceptions in developing countries, but smaller studies show high levels of concern about food safety. For example, results from seven countries found food safety was always a concern for consumers and often the single most important concern about food (Jabbar, Baker, and Fadiga 2010). People's actions (revealed behavior) confirm this: when pig diseases were initially reported by the media in Vietnam, the majority of consumers either stopped eating pork, shifted to chicken, or went to outlets perceived as safer (Lapar and Toan 2010). Similarly, assessments conducted in the context of Rift Valley fever outbreaks in Kenya found consumers asked to see butchers' certificates, and demand for ruminant meat dropped as consumers switched to poultry (Rich and Wanyoike 2010). Food safety has become an issue of enormous public concern in China (Garnett and Wilkes 2014). One survey found Chinese people reported food-borne disease was the second greatest risk they faced in daily life (after earthquakes), and 92 percent of respondents said they expected to soon become victims of food poisoning (Alcorn and Ouyang 2012).

While TCB schemes are likely to target markets where food safety is an issue, consumers may not always be aware or concerned. This is especially true in the case of new market development. The status of consumer concern about food safety differed in the pilot sites and differs in the L&F target value chains (Roessel 2013). For example, preliminary results from ongoing studies in India on consumer awareness of food safety and nutrition showed that following the release of government findings that nearly 70 percent of milk was adulterated, less than 30 percent of consumers "totally" or "significantly" adjusted their consumption (unpublished results from Roy 2014). In Assam, consumers were concerned about milk adulteration but trusted their own suppliers, and although most considered themselves to be good judges of adulteration, in fact their ability to detect adulteration was no better than chance. In Vietnam, there was less trust in vendors, but consumers felt disempowered to make good judgments. As one consumer reported, "I cannot believe in any butcher in market even when I bought pork from supermarket. But I still have to accept to buy and eat these pork."(ILRI, 2010, 3)

Results from ongoing studies illustrate the need for consumer education on food safety. In the India study, surveyed consumers were able to identify few adulterants, beyond water, and knowledge of the human health effects of adulteration were similarly low (unpublished results from Roy 2014). If there are food safety issues consumers are not aware of, this suggests additional intervention efforts aimed at these consumers would be necessary to consider.

Status of the Evidence: Medium

Evidence is available, especially from experimental studies, to show that consumers are concerned about food safety, but whether this can translate to a meaningful and sustained incentive for value chain actors to change their behavior remains to be seen.

Consumer Trust Branding

In a study on consumer awareness of food safety in India, 51 percent of consumers reported that they had never looked at nutrition labeling or any certification in milk (unpublished results from Roy 2014). Trust is an issue. In a survey in Kenya, consumers reported low confidence in government certification (Walke et al. 2014).

In the India study mentioned earlier, of the third of consumers who did adjust their consumption as a result of the evidence on milk adulteration, 65 percent of them reported moving to a branded product, which presumably cost more (unpublished results from Roy 2014). The value of the brand depends on the trust consumers place in it. In many countries, international brands are trusted; sometimes large-scale national producers are perceived to offer higher-quality products, although this is not always supported by evidence (Grace et al. 2014). In ILRI pilot interventions, the reputation of the research and development organizations involved in the projects appears to have been the source of trust. Whether this could be maintained after the project, and whether there would be opportunities for fraud related to the branding activities needs to be assessed.

Status of the Evidence: Weak to Medium

Consumers appear to have low trust in certification and in some cases prefer branded products. However, it seems like the type of branding in the studies cited, for example, international brands, is different from the types of branding activities that traders and other value chain actors engage in as part of the TCB interventions. How much the branding activities influence consumers and whether the costs of undertaking them are really worth it for traders needs to be assessed. To the extent that branding can be linked to actual risk-mitigating practices that are visible to consumers—for example, butchers' wearing protective clothing or milk traders' using improved metal containers versus plastic ones—benefits would be increased and opportunities for fraud reduced.

- ***Likelihood that changes in knowledge, attitudes, and skills will lead to changes in practice: Medium.***
  Practices appear to be economically beneficial to traders, though it would be important to validate these benefits in rigorous evaluations in different contexts. Particularly important would be to understand the role that certification and branding play for traders, consumers, and the government in instilling confidence in the safety of their food systems.

From Positive Reach to Changed Knowledge, Attitudes, and Skills

The training is intended to provide traders with the knowledge and skills to become certified and use better food-handling practices. For this to happen traders need to be able to access the training, including accepting any costs involved (box A2a in Figure 4.1). For them to complete the training successfully, it will be important that the traders relate well to the knowledge and practices being described.

Traders Can Access Training

Even where traders are interested in attending and willing to attend training, a variety of factors could constrain their ability to do so. Cost, in time or cash, is an obvious consideration; however, other factors from social and gender norms to levels of literacy and numeracy could influence who feels able to attend.

In Nigeria, to reach more people cost-effectively, an interactive training workshop was held for representatives of associations. The representatives were selected by the association members and were encouraged to train their fellow group members in what was learned. A training of trainers–type approach can be cost-effective, but follow-up about whether the capacity building that occurred through this indirect training was a good as what happened in the workshop will be important. Where certification and branding are important, mechanisms for linking these to indirect training would need to be devised.

Status of the Evidence: Medium

Pilots had good participation, and innovative approaches were tested. It will be important to see whether these can be maintained during implementation at scale.

Training Materials and Approaches are Relevant, Effective, and Appropriate

In all the pilot studies, the training materials were developed based on quantitative and qualitative research not only on food safety risks but also on the existing knowledge, attitudes, and practices of actors along the value chain related to hygienic production and handling practices. Trainings were led by local facilitators and were interactive. As mentioned earlier, emphasis in some cases was on basic principles rather than complex technical processes. In some cases (for example, Nigeria) there were follow-up visits with participants in their places of work.

Status of the Evidence: Medium

Pilots were well designed and implemented, but more analysis is needed on whether some types of traders were not reached and on whether the costs and approaches are sustainable at scale.

- ***Likelihood that positive reach will lead to changed knowledge, attitudes, and skills: Medium.*** The training materials in pilots were well designed and based on a good understanding of current practices and evidence of food safety risks along the value chain. Whether this quality can be maintained over time and at scale needs to be demonstrated. The findings from the Kenya follow-up study will be important evidence on this issue.

Will the Intervention Reach the Traders?

The pilots were successful in reaching a large number of traders. Effectively reaching traders requires that the right information be disseminated to the right people through the right channels (box A1a in Figure 4.1). It also may require an enabling policy environment so that informal traders are willing to be identified and to participate in activities without fear of penalty.[6]

Right information Disseminated to right People through Right Channels

As described above the pilots were all part of research initiatives and benefited from value chain assessments that included not only identification of food safety hazards but also identification of actors, including traders, and an assessment of the policy context. Such information is used in targeting and in crafting effective messages. Where there are large numbers of traders, the intervention may need to be targeted to specific types of traders (for example, largest consumer base, most likely to have poor-quality milk, and so forth) or representatives of trader associations (if they exist; if they don't, then creating them may need to be part of the intervention). Deliberate strategies may be needed to reach traders who may have limited access to information.

The existence of a sufficient number of traders is a potentially important issue where interventions are seeking to develop the value chain as part of an overall sector development plan (for example, Tanzania case) rather than to address current or emerging food safety issues in already-developed markets (for example, Kenya, Assam). The goal might be to reach future rather than current traders, possibly also with specific objectives of increased participation of the poor or women.

Experience suggests that traders are often initially nervous about a focus on quality and safety issues, especially adulteration (Roesel and Grace 2014). Careful messaging is needed to reassure traders that the purpose of the intervention is not to identify and punish poor performance but to build a quality

[6] Effectively reaching traders also requires that the intervention actually be implemented. How this prototype intervention will be taken up and implemented and by whom (nongovernmental organization, government, private sector) will be the subject of a separate ToC to be developed.

brand. The public health approach of harm reduction is especially useful. This approach incorporates strategies to manage behaviors, sometimes risky or illegal, to reduce the associated harmful consequences. Power relations among different categories of traders, regulators, and consumer groups may also be important, and more research may be needed on how to formulate and disseminate effective messages in different contexts.

Status of the Evidence: Medium

The pilots started with a good understanding of the actors and issues. The challenge will be whether this level of understanding can be sustained and scaled up and if not, what the implications will be for effectiveness. Again, the Kenya follow-up study could shed light on this.

Enabling Policy Environment

As the Kenya case study shows, policy engagement related to the status of informal markets may be a necessary first step for a program to be able to operate legally. Even where this is not required to initiate an intervention, long-term sustainability requires a link with a government agency to effect change in the policy environment. Both the Kenya and the Assam cases involved close engagement with government. In Tanzania, policy engagement focused on milk safety, and pro-poor dairy development is being undertaken. Strengthening the trader networks and building linkages between traders and authorities were key parts of this long-term strategy. Building traders' social capital may be important to creating and sustaining an enabling environment.[7] The Kenya case is an example of how the alliance of traders, civil society, and research were able to win a policy victory; however, preliminary findings from the follow-up study suggest that there are still policy and regulatory challenges for the informal-sector actors (D. Grace, personal communication, June 16, 2015).

It should be noted that in the case of the four pilots, engagement with authorities took the form of involving them in research. If authorities participate in prioritizing issues and defining research questions and approaches, their willingness to take on board the results and even experiment with innovative solutions would be more likely. This may have been viewed as a more mutually beneficial and less threatening way to engage with authorities, especially in an area that can be controversial because of its links to market development and trade.

Status of the Evidence: Medium to Good

The need to strengthen the enabling environment was an explicit part of the pilots and was done successfully, even at the national level. The Kenya experience generated interest in the region, and the lessons and experiences have been shared widely with countries in the region and beyond.[8] This may have been facilitated by the fact that the pilots were closely linked to research and to international research organizations that were well regarded in the countries. Whether this same degree of constructive engagement with authorities or other civil society actors could be achieved if the interventions were implemented by other organizations needs to be established. It also remains to be seen whether the success in Kenya can be maintain and enhanced over time.

- ***Likelihood that intervention will reach traders: Medium to high.***
  As part of the pilots, strategies for identifying and reaching traders and engaging with policymakers and other authorities were developed. What remains to be seen is whether these can be sustained and adapted and applied by other organizations with similar success.

[7] The details of such an engagement would be described in a specific ToC for the enabling environment, outlining how engagement with policy and regulatory actors is planned to take place.

[8] Some examples can be found at http://www.ilri.org/InfoServ/Webpub/fulldocs/ILRIAR2001/South-South.htm and http://clippings.ilri.org/2014/04/25/iadg-dairying/.

5. DISCUSSION

The TCB approach, as developed in Kenya and adapted in India, Nigeria, and Tanzania, appears to have the potential to contribute to improvement in the quality of meat, milk, and fish sold in informal value chains. The basic logic of the pathway is clear, and there is evidence to support most of the key underlying assumptions (Table5.1). Some of the gaps are likely to be addressed though ongoing research; however, others will need to be filled through new research and expanded pilots, especially at scale (Table 5.2).

Table 5.1 Summary of likelihood of outcomes and strength of evidence from theory of change

Outcomes and likelihood of occurrence	Assumptions	Strength of evidence
Will improvements in the quality of product sold lead to increased consumption of safe meat, milk, and fish?	Current quality and safety of meat, milk, and fish consumed by poor households is low.	Medium to strong
Likelihood: High	Share of meat, milk, and fish accessed in markets is high.	Strong
Will changes in trader practices lead to improved quality of product sold?	Practices are effective.	Strong
Likelihood: Medium to high	Trained traders are a large share of market.	Medium to strong
Will changes in knowledge, attitudes, and skills lead to changes in practice?	Practices are feasible and generate benefits to traders.	Medium
Likelihood: Medium	Traders have incentives to get certified.	Weak to medium
	Consumers are concerned about food safety.	Medium
	Consumers trust in branding.	Weak to medium
Will positive reach lead to changed knowledge, attitudes, and skills?	Traders can access training.	Medium
Likelihood: Medium	Training materials and approaches are relevant, effective, and appropriate.	Medium
Will the intervention reach traders?	Right information reaches right people through appropriate channels.	Medium
Likelihood: Medium to strong	Policy environment is enabling.	Medium to strong

Source: Authors.

Table 5.2 Summary of additional research to fill key evidence gaps

Outcomes and likelihood of occurrence	Assumptions	Research needs
Will improvements in the quality of product sold lead to increased consumption of safe meat, milk, and fish?	Current quality and safety of meat, milk, and fish consumed by poor households is low.	Ongoing value chain characterization activities in all L&F value chains will provide systematic evidence of risks and mitigation practices by consumers.
Will changes in trader practices lead to improved quality of product sold?	Trained traders are a large share of market.	Kenya follow-up study will provide evidence on how well the TCB was sustained at scale.
Will changes in knowledge, attitudes, and skills lead to changes in practice?	Practices are feasible and generate benefits to traders. Traders have incentives to get certified. Consumers are concerned about food safety. Consumers trust in branding.	Rigorous impact evaluations of TCB interventions are needed. Develop L&F consumer theory of change; document and understand consumer response to TCB interventions in current pilot sites; where justified, test cost-effectiveness of specific consumer-oriented components of TCB interventions in impact evaluations.
Will positive reach lead to changed knowledge, attitudes, and skills?	Traders can access training. Training materials and approaches are relevant, effective, and appropriate.	Assess in pilots and monitor at scale.
Will the intervention reach traders?	Right information reaches right people through appropriate channels. Policy environment is enabling.	Assess in pilots and monitor at scale. This should be included as part of an analysis of the enabling environment for scaling up TCB interventions in pilot sites; broader analysis of policy contexts could facilitate scaling up beyond L&F target value chains.

Source: Authors.
Note: L&F = livestock and fish; TCB = training, certification, and branding.

One key area for additional targeted research is to better describe and document the impact of the intervention on development outcomes at the trader and market level. Existing studies find evidence of impacts on milk quality and trader income; however, more—and more rigorous—evaluations are needed, along with a theory that explains how traders are realizing benefits.

Another related area for additional research would be clarity about the role of the certification and branding aspects of the intervention. In theory, the value of certification would be to enable traders to charge higher prices, but if this is not intended to happen, it calls into question the reason for including this component in the intervention, particularly where the informal sector is not explicitly banned. It may be that certification benefits traders indirectly by improving their standing in the eyes of authorities, for whom increased formalization of the sector is an objective. If this is the case, it has implications for how certification should be designed, implemented, and costed.

Since the branding is, in theory, based on certification, the role that this plays also needs to be better understood so that it can be incorporated in the most cost-effective manner into the intervention. While the pilots did not rigorously document consumer responses to branding, there are reasons, largely related to customer loyalty and ensuring stable demand that traders might invest in branding even if they do not anticipate a higher price for a branded product, at least in the near term. Consumer response to branding and the implications for trader behavior are important areas for future research, for example, through evaluations comparing alternative approaches to branding.

While additional research can strengthen the ToC and inform implementation, perhaps the priority in this area should be on clarifying how and by whom this approach can be adapted and scaled in different countries and value chain contexts. The Kenya follow-up study will provide important evidence on scale and sustainability issues. The development of a scaling ToC could help A4NH and L&F to identify and engage key partners from public, private, and nonprofit sectors for implementation at scale in target value chains.

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Fax: +1-202-467-4439
Email: ifpri@cgiar.org