ILRI MANUAL

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Protocol to guide the testing and evaluation of innovations for improved value chain performance within the CGIAR Research Program on Livestock

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Science for resilient livelihoods in dry areas


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Protocol to guide the testing and evaluation of innovations for improved value chain performance within the CGIAR Research Program on Livestock

Version 1

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June 2019

ILRI thanks all donors and organizations which globally support its work through their contributions to the CGIAR Trust Fund

Editing, design and layout—ILRI Editorial and Publishing Services, Addis Ababa, Ethiopia.

Cover photo—ILRI/Stevie Mann

ISBN: 92–9146–569–3

Citation: Baltenweck, I., Kassie, G.T., Omore, A., Ouma, E., Poole, J. and Teufel, N. 2019. *Protocol to guide the testing and evaluation of innovations for improved value chain performance within the CGIAR Research Program on Livestock*. Version 1. ILRI Manual 34. Nairobi, Kenya: International Livestock Research Institute (ILRI).

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Abbreviations and acronyms

CRP	CGIAR research program
DDF	Dairy Development Forum
DMP	Data management plan
FIES	Food insecurity experience scale
HDDS	Household dietary diversity score
HFIAS	Household food insecurity access score
HH	Household
ICARDA	International Centre for Agricultural Research in the Dry Areas
IDDS	Individual dietary diversity score
ILRI	International Livestock Research Institute
IP	Innovation platform(s)
IREC	Institutional Research Ethics Committee
LLAFS	Livestock Livelihoods Agri-Food Systems
M	mandatory indicators
MSP	Multi stakeholder platforms
O	Optional indicators
RCT	Randomized controlled trial
RHoMIS	Rural household multi-indicator survey
ROA	Return on assets
ROI	Return on investment
ToC	Theory of change
VC	Value chain
vs.	versus

Introduction

1.1 Innovations for improved value chain performance and their evaluation

Testing integrated packages of technological and institutional innovations in the four priority CGIAR research programs (CRPs) countries places the CGIAR Research Program on Livestock in a unique position to generate lessons from different 'experiments'. How these 'experiments' are conducted and what data are collected will; however, determine whether a global synthesis is possible. This protocol proposes a way to harmonize the design, methods, procedures and evaluation of research and development efforts for some of the 'experiments' conducted within the CGIAR Research Program on Livestock framework. Harmonizing the design and conducting and evaluating 'experiments' will help to synthesize lessons over space and time. It will also help to enhance the efficiency of scaling up/out of the tested innovations and support the design of similar efforts to address various challenges or harness relevant opportunities.

This protocol focuses on innovations (such as organizational and business models) for value chain (VC) performance.[1] Broadly, such innovations are 'when people and organizations (actors) strategically mobilize others through networking in order to redesign or replace institutions' (Loconto et al. 2016). Policy related interventions which have indirect and more long-term effects are not covered by this protocol.

The CGIAR Research Program on Livestock provides research-based solutions to help smallholder farmers, pastoralists and agro-pastoralists transition to sustainable, resilient livelihoods and to productive enterprises that will help feed future generations. The program's research and development outcomes are delivered through five flagships: Livestock Genetics, Livestock Health, Livestock Feeds and Forages, Livestock and the Environment and Livestock Livelihoods and Agri-Food Systems.

Such innovations are not only tested in the Livestock Livelihoods Agri-Food Systems (LLAFS) flagship. Rather, all flagships have a 'delivery' cluster that entails working with livestock producers and other VC actors in changing how a service (e.g. animal health provision) or an input (e.g. fodder seeds) is delivered. From the work conducted previously, and in particular within the CGIAR Research Program on Livestock and the CGIAR Research Program on Fish, these innovations can be clustered into three main types:

A. Innovations centred around producers and producers' collective action

- In many developing countries, farmers' collective action is often identified as an appropriate entry point to improve VC performance, channel inputs and services, and output marketing more efficiently. This improvement is expected within the context of a low level of marketable surplus and the fact that livestock farmers are often small scale and geographically scattered. Collective action takes different forms: cooperatives, farmer groups and

1 This is aligned with the Livestock, Livelihoods and Agri-Food Systems (LLAFS) Product line on 'Menu of organizational and business models for improved livestock value chain performance'.

business hubs.

- The innovations tested can take many forms and include catalyzing the formation or strengthening of such groups, linking potential agri-business inputs and service providers, and enhancing capacity of the actors at the lower end of the value chains. While the entry point is at farmers' level, there is also an effect on other actors—for example, private feed suppliers may start working with farmer groups or hubs.

These innovations are implemented in Ethiopia (small ruminants—to assess whether market information and collective action improves market participation and performance), Tanzania (dairy—to assess whether stronger linkages between farmer groups and service providers improve uptake of technologies, productivity and responsiveness to market barriers) Uganda (pig—to assess mechanisms in strengthening profitable linkages between farmers and aggregators and to incentivize farmers' uptake of technologies and practices) and Kenya (dairy—to assess whether a credit facility linked to milk deliveries affects technology update and productivity).

B. Innovations focusing on nonproducer VC actors (either individually or in groups), working with a single type of actors

- These include the work related to inputs and service providers, including feed suppliers, animal health inputs (drugs) and service (e.g. vaccinators) providers, breeding services suppliers (e.g. artificial insemination, bull owners), traders, butchers or any other actors except the livestock keepers.
- Capacity building, facilitating linkages with other actors (e.g. linking feed suppliers with financial institutions or linking traders to producers), among other interventions.
- The CGIAR Research Program on Livestock works with these actors in two main ways: to improve these actors' livelihoods (e.g. working with milk traders to improve milk traders' income) and as a means to improve the livelihoods of the 'end beneficiaries', usually the livestock keepers (e.g. working with animal health service providers to improve livestock keepers' access to better and more affordable services for higher livestock productivity) or consumers (e.g. more efficient school milk programs for children as consumers). The two are closely linked but distinction is important when identifying success indicators.

These are, or have been, implemented in Uganda (pig—training of butchers), Kenya (small and large ruminants—animal health mobile clinics) and Tanzania (cattle—infection and treatment method vaccinators training and certification). Another example is the proposed alternative school milk program in Kenya (based on loose milk from nearby producers) with the schools being the entry point for the intervention.

Innovations aimed at improving overall VC coordination and performance

- These include innovation platforms (IPs) and multi stakeholder platforms, contract farming and accelerator programs[2].
- Improving VC coordination and performance also includes capacity building and facilitating linkages with other actors to connect them to input supply and output markets and services.

These are, or have been, implemented in Nicaragua (dairy—IP at the national level), Tanzania (dairy—IPs at various levels and business opportunity seminars for VC actors) and Uganda (pig—IPs at various levels). The African Dairy Genetic Gains data platform implemented in Ethiopia and Tanzania is another example.

In some cases, more than one innovation is tested in the same VC. For example, three types of innovations were implemented in Tanzania during the CGIAR Research Program on Livestock and Fish. While the evaluation of a combination of innovations is more complex than the evaluation of a single innovation, the principles described in this protocol still apply.

2 Accelerator programs are defined as programs of a fixed duration (a few months), working with cohorts of people to start up or strengthen a new business. Besides financial support (seed capital), the beneficiaries are also provided with mentorship and networking opportunities. It may also include an event when pitches are organized to attract potential investors (Cohen, S. What Do Accelerators Do? Insights from Incubators and Angels. Innovations. 8 (3–4): 19–25. doi:10.1162/inov_a_00184. Retrieved 17 December 2018).

As this protocol is about innovations aimed at improving VC performance, it does not apply to interventions with no or limited effects on other actors' behaviour, productivity or livelihood. See Box 1 for examples to clarify.

Box 1: When to use (or not use) this protocol example: a new variety of fodder seeds

- Distribution of fodder seeds to assess the feasibility of the variety is about testing the technology, with limited effect beyond the farmers receiving the materials. It is not covered by this protocol, as the research looks at technical suitability and producer level adoptability (a very important part of the research!).
- Engaging agrovet shops and other distribution networks in sourcing, selling and possibly providing guidance on use of the new variety will affect the availability of the new variety and hence farmers' uptake of different fodder varieties. This is covered by this protocol—looking at how agrovet business changes and also at farmers' adoption and the resulting livelihood impact. It is an enabling mechanism that affects different actors and, therefore, VC performance.
- Engaging with decision makers on rules and regulations regarding the certification process of new fodder varieties will affect, once successful, the availability of fodder and farmers' adoption of fodder varieties. While this intervention affects the overall VC performance, it is a policy intervention that is not covered by this protocol as the impact will be more indirect and longer term.

1.2 Objectives of the protocol

This protocol aims to guide researchers in designing evaluation of innovations for improved VC performance in the context of the CGIAR Research Program on Livestock. The goal is to harmonize both the evaluation design and the indicators tracked in order to conduct comparative or a synthesis analysis. It therefore aims:

- to guide evaluation of the performance and livelihood impact of innovations for improved VC performance.
- to guide scientific synthesis and comparison of these innovations applied across enterprises, locations and/or livelihood systems.

Only when using similar designs and metrics to evaluate (at the end of the 'experiment') the performance and livelihood impact of different innovations across projects (e.g. species, systems, VCs, countries) will a synthesis be possible. The synthesis will be performed along the three types of innovations described above.

During the CGIAR Research Program on Livestock and CGIAR Research Program on Fish, the assessment of VC actors' constraints and opportunities as well as the identification of innovations as entry points for interventions were done relatively consistently across the CRP sites. On the other hand, the testing and evaluation of these innovations was not sufficiently coordinated. It has, therefore, not been possible to synthesize this work as the different projects used different indicators of VC performance and varied designs. For example, IPs were used in Egypt, Nicaragua, Tanzania and Uganda but no common evaluation framework was used (e.g. no common indicators of progress or success). See Box 2 for the case of IPs assessment and the inability to conduct a synthesis. This protocol aims at filling this gap.

Box 2: How IPs were tested and evaluated: the CGIAR Research Program on Livestock and Fish experience

IPs were implemented in four countries with the objective of improving coordination between VC actors.

In Egypt, the aquaculture IP process was launched in 2014, with district meetings followed by national meetings. Six working groups were formed, looking at various topics (e.g. access to water, development of markets), with

WorldFish facilitating the meetings. Unfortunately, the political turmoil in the country prevented policy advocacy and no impact of the IPs could be detected in this country.

In Uganda, alliances in the form of pig multi-stakeholder platforms (MSPs) have been established since 2014 to foster and support collective participation of pig VC stakeholders to act and learn together to address the pig VC challenges, including gaining visibility and voice, driven by a shared vision. A national and three regional MSPs covering the eastern, central and greater Masaka regions were established in 2014. Two additional regional platforms (northern and western) were established in 2015. Constraints were identified and prioritized, with poor quality feed being the top constraint in three of the five regional platforms. In 2017, participants assessed the contribution of MSP activities to solving the feeding challenge, using a score (0=None, 1=Very little, 2=Some, 3=A lot). While the majority of the task force leaders (65%) scored 2, among members of the Masaka regions MSPs, the score was lower, with an average of 1.7.

In Tanzania, the CGIAR Research Program on Livestock and Fish researchers facilitated the establishment of eight village level IPs in Morogoro and Tanga regions and a regional level platform in Morogoro. The CRPs also facilitated the formation of the Dairy Development Forum (DDF), an MSP at the national level that brings together different industry players to find solutions to industry challenges. The impact of DDF was assessed using a structure-conduct-performance paradigm (Kago and Cadilhon 2014).

In Nicaragua, an IP was used to identify pathways for change and develop concept notes based on their ideas for interventions. A concrete product is an integrated decision-making toolbox for livestock production enabling smallholder farmers to make better decisions on their farms to increase productivity and natural resource integrity, as well as to enhance ecosystem services. Landmann and Cadilhon (2018) report on the business relationship constructs of trust and capacity development in the Nicaragua Learning Alliance, also using a structure-conduct-performance framework.

1.3 Rationale for designing this protocol

Developing a protocol requires a careful analysis of the different possible designs and implementation mechanisms employed by research projects given the context of interest. When designing this protocol, we aimed to strike a balance between:

- Making the protocol too broad and with too many options. Although this would have accommodated more projects, we may end up with widely disjointed activities from which it is virtually impossible to draw a common lesson.
- Making the protocol too detailed and prescriptive. This would result in the potential for strong comparisons or synthesis, but few projects may be able to accept or afford it.

We therefore suggest a middle ground, with a minimum set of metrics to measure and analyse, and an overall design to follow.

Note that a comparison will be possible when the same innovation is being tested in more than one VC and the protocol is implemented. A synthesis will be performed when the interventions tested, while having the same objective, are different. For example:

- The mobile animal health clinic as implemented in Kenya can be replicated in the agropastoral areas in Ethiopia. If that specific intervention is tested (agrovet shops providing services on predefined routes), is tested following a common design, we will be able to compare its effect.
- The objective of the intervention is about increasing farmers' access to animal health inputs and services. If in Ethiopia the intervention is channeling these inputs and services through extension staff, rather than supporting mobile private animal health service providers, a *synthesis* will be possible, but not a comparison.

While this protocol is about evaluating innovations for improved VC performance, there is a clear link with the overall CGIAR Research Program on Livestock impact assessment work as explained in Box 3. Box 4 articulates reasons for the CRP Livestock researchers to follow this protocol, or how to incentivize them, looking both at research (in particular being part of a wider research agenda) and financial (allocation of W1/2 funds) incentives.

Box 3: How to incentivize researchers to follow this protocol

With the bulk of project financing coming from bilateral sources, it is clear that scientists focus on meeting individual project objectives and answering specific research questions. While it is widely recognized that one of the main com- parative advantages of the CGIAR and the CRPs lies in cross country work, it is not always easy to implement such research. This protocol aims to support such cross country, cross-VC and cross disciplinary work, which will address the common call for development research to provide evidence on larger geographical scales. This may also be attractive to some donors.

At the same time, centres and CRP management have encouraged researchers to map bilateral projects to CRP flagships, although the benefits of doing so are not always clear beyond accessing funding to finance a shortfall. This protocol can be seen as an opportunity to better align our work to the broader CGIAR Research Program on Livestock agenda. By implementing this protocol, a synthesis (or comparison) will be possible across countries and VCs, increasing the reach and attractiveness of our research. Another way is to guide allocation of W1/2, in two ways: first, projects testing an innovation for improved VC performance and requiring W1/2 support (e.g. overhead shortfall) would need to use this protocol to access these funds. Secondly, W1/2 funds would be prioritized to projects testing such innovations that have insufficient resources to implement the full protocol (e.g. a project not having the funds to include a counter factual group would receive W1/2 to do so).

1.4 Conceptual framework

To provide an empirical basis for the selection of suggested indicators, we present here a conceptual framework based on the literature on VCs (ILRI 2013; Kaplinsky and Morris 2000).

In the context of the CGIAR Research Program on Livestock, VCs are an important vehicle to achieve livelihood impacts as it touches on relevant economic, institutional and social systems. An efficient VC is hypothesized to be an especially effective pathway towards achieving livelihood impacts. VCs are defined as the full range of activities which are required to bring a product or service from conception through the different phases of production (involving a combination of physical transformation and the input of various producer services) to final consumers and final disposal after use. Livestock VCs have unique features, as these products are relatively high value, bulky and perishable (and therefore their conservation and storage for use is not as easy as it is for other products such as cereals). Moreover, the delivery of some inputs, like animal health and genetics services, is costly as they require specialized expertise and often cold chains. At the livestock keepers' level, besides providing products like milk, meat and eggs for home consumption or sale, livestock performs multiple functions. Livestock assets often comprise the primary means of inflation-proof savings and insurance in rural areas where formal financial services may be unavailable. This means that livestock keepers' decisions in terms of type and level of participation in the chain is influenced by many factors.

In this protocol, we propose two sets of indicators. The first set focuses on VC process or efficiency to capture the direct and more short-term effects of the tested innovations. The second set consists of the longer term, livelihood impact indicators on various value chain actors.

For the selection of the first set of indicators of VC improvement effects, we use the structure-conduct-performance conceptual framework as well as an internal ILRI document on VC performance indicators. The structure-conduct-performance conceptual framework has been used extensively in the livestock VC literature (see for example Jabbar et al. 2007 and Kago et al. 2015). The 'structure' part and some of the 'conduct' components can be described using a VC mapping diagram, as presented in the next section, including estimated shares of various actors' participation (for example, percentage of product sold to different outlets, or women and youth participation in trading). For the other

two parts, 'conduct' and 'performance', we follow ILRI (2013) to assess VC performance along six dimensions: (1) financial performance, (2) efficiency, (3) product suitability, (4) innovation and upgrading, (5) equity and (6) resilience and risk. While these six dimensions all have an impact on the competitiveness of the studied VC, the research topics and questions will determine the indicators to track and it is not realistic for any specific project to capture them all. This protocol has therefore selected indicators that were deemed to (1) best synthesize that dimension and (2) be applicable to as many research questions as possible. We also identify mandatory and optional indicators, but this does not preclude researchers' decisions to include more, from the ILRI 2013 document or other literature.

For the selection of the second set of indicators of value chain actor impacts, we use livelihood impact indicators widely used in other studies (Hammond et al. 2016). These include household income or expenditure, resilience and enrollment of children in school (see for example Khonje et al. 2018). We also include indicators of food and/or nutrition security.

2 Proposed research methods and procedures

For a synthesis or comparative evaluation of institutional innovations, two key components are needed:

1. All projects collect a minimum set of the same indicators and associated metrics; and
2. All projects use a well-defined design including: a counterfactual and preferably also before/after measurements, consistent definitions of interventions, an appropriate sampling strategy and sample size justification, representativeness and scalability.

Indicators provide measures with which innovation effects are determined, providing the 'evidence' for the evaluation; they focus on the final impact level (livelihood impact indicators) and/or at intermediary stages along the impact pathway (process or efficiency indicators). Note that these indicators may also be useful for other types of innovations other than those described in this protocol.

Within this protocol we propose a minimum set of indicators and associated metrics. These are indicated as mandatory (M) in Tables 1 and 2. Additional detailed but non-mandatory indicators and metrics that a project may wish to collect, depending on its focus are indicated as optional (O). The tables present the indicators in the two broad categories introduced above: (1) VC process or efficiency indicators and (2) livelihood impact indicators. The tables also indicate which indicators are to be collected by type of innovations (the three types described above). As described below, data are to be collected from intervention (treatment) and control (counter-factual) units as well as, preferably, before and after the intervention to determine changes. Monitoring the selected indicators at additional points in time (e.g. mid-line) strengthens the analysis.

The current version of this document provides links to existing tools; a subsequent version will aim to provide more detail on data collection and analysis procedures for greater efficiency and consistency across studies, sites and countries.

2.1 Process/efficiency indicators

Table 1 lists efficiency or process indicators focusing on the intermediate steps towards achieving livelihood impacts. They are classified under structure, conduct and performance subtitles as explained in the conceptual framework section. Some additional information on these indicators is provided in the following.

Structure

Understanding the structure of the VC: A VC map is drawn, and qualitative and quantitative information is included. A VC map provides a visual presentation of the VC. The data to be collected include the sequence of production and

marketing functions until final consumption, and types of actors with corresponding information on age, gender and minority groups when possible. Tools for VC mapping are available in the GIZ Value Links Manual (Springer-Heinze 2008) and the VC module in Baltenweck et al. (2018).

Volumes transacted: This refers to the volumes of the VC commodity transacted by the actor(s) in the focus VC. Data to be collected are the volumes of the commodity produced or transacted during a specified period at the various VC nodes identified during the VC mapping exercise. Seasonal aspects might be important.

Market orientation: This is a measure of the proportion of the VC commodity that is marketed relative to what is produced. Data are collected at producer level and include volume of the commodity produced, and volume sold. Increases in market orientation may indicate improved attractiveness of the VC to producers.

Conduct

Types of business linkages: This refers to types of VC linkages between the actors. The linkages are also presented in the VC map. Greater detail on the types of linkages will enable the assessment of the VCs integration. The types of linkages include uncoordinated transactions ('spot markets') or binding contracts made in advance.

Price: This refers to the price of the commodity, input or the service along the nodes of the VC, i.e. input prices, producer price, aggregator price, processor price, retail price and consumer price When relevant, seasonal data are to be collected. Price increases along the VC allow for an estimation of share of value-added at each node relative to consumer prices.

Performance

Distribution of gross margins: This is an indicator of VC efficiency and of equity amongst VC actors. The gross margin is the difference between revenue and variable costs associated with production, processing or trading of the VC commodity accruing to the actor. Data to be collected include volumes of the target commodity produced, market prices and all variable costs associated with the production or transaction of the commodity along the various VC nodes. By calculating gross margins for the different actors, we are also able to look at the distribution of total gross margins across VC actors, an equity indicator.

Total value added and distribution of value added along the VC: Total value added is a measure of the performance of the whole VC and refers to the total value of all services and/or products produced by the VC. The distribution of value added is the share of value added generated at different nodes of the VC. Value added is calculated as follows: Total value generated by the VC: Total sales value (i.e. price * volume of final product sold) – Value of intermediate goods.

Financial indicators on business performance—annual profits, return on investment and return on assets: Annual profit is an important measure of the financial performance of an economic agent. Each actor in the VC needs to gauge the returns made from selling goods and services over the period of a year. The difference between the total sum of income and the total sum of costs that the actor incurs over a year's time gives the annual profit of an actor in the VC. Return on investment (ROI) is another common ratio used to calculate the financial benefit an economic agent receives in relation to their financial investment. ROI is usually calculated as a ratio of net income divided by the initial capital cost of investment. Return on assets (ROA) is another measure of return on investment with a focus on the asset wealth. It is the ratio of the net annual income of the economic agent to its average asset wealth.

Table 1: Process/efficiency indicators, calculation and types of innovation (M is mandatory and O is optional)

Process/Efficiency indicators	Calculation	Type of innovations
Structure		
Type of actors, number of actors, product flows in a VC—using VC mapping (M)	Qualitative through VC mapping, include shares of product volume at each VC link relative to total volume	A, B, C
Volumes transacted (M) by relevant actor	Sum of product volumes traded	A, B, C
Market orientation (% production sold) (O)	Volume of product sold/volume of product produced	A, B
Conduct		
Number and types of business linkages (M)		A, B, C
Price of VC commodity (M), also capture seasonal price variability if relevant		A, B, C
Existence of standards regulating product quality and actual compliance with the standards (in terms of volumes sold) (O)		A, B
Proportion of rejected products due to substandard (O)		A, B
Existence of grading and certification systems and volume of products sold by grade (M if relevant)		A, B
Proportion of times seller achieves premium grades (M if relevant)		A, B
Performance		
Price (M) and distribution of margins along the VC (O)	Average price per unit of commodity in local currency, actual transaction at specific VC interface	A, B
Value added from the VC and its distribution along the VC (O)	Amount (stage and whole chain) Value added = Revenues – costs of livestock or livestock product purchases – costs of purchased raw material Value added share per stage = Value added at stage I / Sum of VA of whole chain	A, B
Jobs created (O)	Number of people employed by VC actors (excluding self-employment)	A, B, C
Annual profit (O)		A, B
ROA (O)		A, B
Return on variable costs (O)		A, B
Labour efficiency (O)		A, B
Meeting buyer requirements (O)		A, B

2.2 Livelihood impact indicators

At the smallholder producer level, livelihood indicators mainly focus on measures of poverty and food insecurity and/or malnutrition. In Table 2, indicators are recommended that capture the income from the commodity of the intervention and total household income from all sources (both on and off farm). An alternative way to measure this aspect without direct measurement of income is the Poverty Probability Index (PPI®).[3]

3 Probability Poverty Index (PPI®) - https://www.povertyindex.org/

Food security or access at the household level is commonly measured using the Household Dietary Diversity Score (HDDS),[4] Months of Adequate Household Food Provisioning[5] and/or Household Food Insecurity Access Score (HFIAS).[6] These income, poverty and food security indicators can all be captured using the standard Rural Household Multi-Indicator Survey (RHoMIS)[7] tool.

For innovations focused on aspects of nutrition, it may be appropriate to include nutrition security indicators in the evaluation. The Individual Dietary Diversity Score (IDDS)[8] is commonly used here and can be adjusted for specific target populations, for example, women, women of reproductive age and children (e.g. 6–23 months; less than five years). For children, this may also include indicators of anthropometric status.[9]

When the target population for the intervention are other VC actors (e.g. input suppliers, transporters, retailers etc.), for innovation types 2 and 3, besides process and efficiency indicators, it may also be an objective to impact the livelihoods of this population. In this case, the indicators used for livestock keepers may also be used for the other actors.

Innovations with consumers as the final target population may look at evidence of impact at livelihood level using food security indicators (same as producer level) and more specifically changes in availability and price of that commodity.

Table 2: Impact indicators, calculation and types of innovation (M is mandatory and O is optional)

Livelihood impact indicators	**Calculation**	**Type of innovations**
For livestock keepers		A (M) B and C (O)
• Gross income from target commodity – RHoMIS	Sum of all product sales plus value of consumption	
• Total income - RHoMIS	Sum of all product sales plus value of consumption plus off farm income	
• Food security - RHoMIS	HFIAS/FIES HDDS	
• Nutrition security - RHoMIS	IDDS (respondent)	
For other actors - in studies where actors' livelihood is an objective • Income • Food security		B (M) and C (O)
For consumers - in studies where consumers' livelihood is an objective, focusing on food security • Change in availability of the target commodity • Change in price of the target commodity • Share of food expenses		B (M) and C (O)

4 https://www.fantaproject.org/monitoring-and-evaluation/household-dietary-diversity-score

5 https://www.fantaproject.org/monitoring-and-evaluation/mahfp

6 https://www.fantaproject.org/monitoring-and-evaluation/household-food-insecurity-access-scale-hfias. There is an alternative to this measure from the Food and Agriculture Organization of the United Nations called the Food Insecurity Experience Scale (FIES) [http://www.fao.org/in-action/voices-of-the-hungry/fies/en/] that is currently being promoted as an alternative to HFIAS.

7 https://www.rhomis.org/

8 https://www.fantaproject.org/sites/default/files/resources/HDDS_v2_Sep06_0.pdf ; http://www.fao.org/3/a-i1983e.pdf

9 http://www.unscn.org/files/Task_Forces/Assessment_Monitoring_and_Evaluation/Dietary_Diversity.pdf

Box 4: How does this protocol relate to the CRP Livestock impact assessment strategy?

The CRP Livestock supports impact assessment studies to strengthen the body of evidence along its Theory of Change (ToC), especially concerning livelihood improvements of target populations. While numerous studies show the effects of research-based innovations on farm level productivity and profitability, less evidence exists on how these effects lead to achieving the agreed development objectives or sub Intermediate Development Outcomes (listed on the right-hand side of the ToC graphs). The impact assessment work deals with determining changes in indicators linked to these development objectives, brought about by specific CRP led interventions, such as the introduction of innovations. There are two important aspects of impact assessments. The first is the clear and consistent definition of the intervention (or treatment), as well as the identification of control groups for comparison (which helps in determining the situation of not having received the intervention). The second aspect deals with specifying which population is represented by the investigated sample, to assess whether analysis results can be generalized.

One aspect of evaluating innovations for improved VC performance, the topic of this protocol, is also concerned with determining impacts of innovations on the livelihoods of target populations. Such studies would then actually represent impact assessment studies. On the other hand, various other aspects of evaluating innovations proposed in this protocol, especially those focusing on business performance and VC efficiency, concentrate on the more immediate effects of the institutional innovations, not on livelihood impacts. Nevertheless, similar considerations of innovation definition, control groups for comparison and representativeness also apply, as described below in this document.

It is worth noting that the assessments of innovations on livelihood indicators consider causal elements (mainly outcomes and assumptions) in the flagship ToC, providing the links to the development objectives. The studies focusing on performance indicators relate to the section that covers outputs to research outcomes of the ToC.

2.3 Design of the evaluation

The detailed design and sampling plans for the application of this protocol will be unique to each user, given various objectives, context, target population, anticipated level of changes etc. However, there are certain commonalities in evaluation research that require formal design principles and the use of experimental (e.g. randomized controlled trial (RCT)) or quasi-experimental (e.g. natural experiments, matching to account for nonrandom group allocation) designs.

It is helpful to provide a simple ‘checklist’ of issues that researchers should consider when using this protocol. The elements should be relevant to the three different types of innovations, A, B and C, although we recognize that for type C certain elements (e.g. counterfactual) may not be appropriate or achievable.

Clearly describing the sampling process in a protocol encompasses the need for documenting an important component of the research design together with the need for transparency which contribute to the extent to which the findings may be generalizable outside of the research context. The documentation of sampling plans also focuses attention on taking into account the hierarchical structures in the population studied and the variability arising at each level. It is important to think about the sample sizes needed at each of the levels of the hierarchy and document the reasons for choices made and their limitations.

Regarding sample size, this protocol proposes several key indicators to use as a basis for the calculations, using standard sample size equations. For each indicator, an estimate of expected variance of the indicator for that environment is required, from the literature or a pilot study, and the difference (with/without intervention—possibly adjusted for before versus (vs.) after) which we want to show to be significant (e.g. one litre increase in daily milk production per cow). We may also be able to use this approach if we have a clear idea of the analysis (e.g. economic/

production model) which we will carry out and the parameters which will be included. If we have stratification in the design, then the sample size is calculated per level of the stratification variable (e.g. if activity is stratified by agroecological zone then sample size n = number of households per zone). In most cases, we will need to do as large a sample size as our resources (time/money) can manage.

The next subsections answer some frequently asked questions.

i. What is my target population/to what extent can I generalize my results?

This is the population (e.g. the people, animals, farming households, villages or other groups) to which the results are expected to apply. Note that this consideration is appropriate irrespective of the design of the study, even RCTs have a 'context' within which the experiment was conducted.

ii. What is/are the objective(s) of the activity?

The reason for carrying out the study (i.e. the objective) and our target population assist in defining our sampling frame (see below). Throughout this protocol, we distinguish between studies aimed to compare (e.g. same intervention testing in two different contexts) and studies with the objective of synthesizing (e.g. different interventions, in different contexts but with the same overall goal).

iii. What type of counterfactual do I need?

The counterfactual is the situation that would have occurred in the absence of the intervention. Ideally, the outcomes and impact of an intervention are measured by comparing what happened with what would have happened to the same households and communities had the intervention not occurred. Since this can never be directly observed, alternative approaches are required to identify appropriate comparison or control groups. The type of counterfactual required by each project depends on the project objectives but in order to establish that the impact of the project on participants (before/after) is attributable to the project, some form of counterfactual must be used.

Options for with/without comparison to show that changes are attributable to the project:

- Use control sites: Is this realistic (given resources) and ethical considerations? Are there sites which are similar enough in environment to be considered equivalent to the project sites?
- Use control villages/households/actors within a site: Is there likelihood for a 'spillover' effect of project activities to neighboring villages/households/actors? Is it confirmed that 'control' households/villages will not join the project later or that the time lapse can be documented and the sites used as 'staggered controls' (see below)?
- Alternatives to control sites/villages/households/actors:
    - Identification and measurement of external factors which may explain changes in key indicators, in order to separate the effects of the intervention from the effects of other 'environmental' changes. Secondary data from key informants, government agencies or literature may provide this information.
    - Differing combinations of interventions across sites (i.e. sites become the 'controls' for each other)
    - Staggered interventions (i.e. status prior to each intervention becomes the control for previous interventions) or staggered recruitment to study—requires very detailed and regular monitoring and evaluation.
    - Repeated measurements e.g. baseline, endline, midline, annual monitoring?

The use of this evaluation protocol enables researchers to generate evidence to compare and/or synthesize across activities given the use of common indicators and/or design. Similarly, the repeated collection of data at key steps in the research process also provides stronger evidence for the evaluation. Specifically, it can establish that intervention and control sites are equivalent at baseline, provide intermediate evidence of intervention effect during the activity (midline), and provide the final level for indicators (endline). Depending on the design of the study, changes in these measurements can also be used to evaluate the intervention effect (e.g. difference-in-differences methodology).

iv. What methods can I use to sample producers/other actors/groups?

There is a huge variety of sampling methods for selecting units (producers, other VC actors, consumers— individuals or groups) to survey, often called by different names and frequently, especially for complex surveys, involving a combination of methods. Some basic methods are outlined below along with a few comments on when they might be used.

Simple random sampling:

- This is a sampling procedure where all sampling units have equal probability of being in the treatment. We use this if we have no obvious stratification indicator.

Stratified random sampling:

- If we have important indicators where the survey response is likely to differ between levels of the indicator (e.g. female headed vs. male headed households, urban vs. rural markets etc.) then we stratify by this indicator.
- If we want to have a 'control' population for the with/without comparison, then our stratification indicator is 'project unit' vs. 'control unit'.
- We randomly sample units within each level of the stratification indicator.
- 'Sites' are often one of our stratification indicators if they have varying characteristics.

Cluster random sampling (also known as two-stage sampling):

- Randomly select clusters within a site (e.g. districts within provinces, villages, markets).
- Randomly sample units within each cluster.
- Often clusters are stratified (e.g. by village size, population density).
- The method is commonly used because resource constraints don't allow us to do completely random sampling.
- We need to balance the number of clusters and number of units within a cluster. The common principle is to maximize the number of clusters and minimize the number of units within a cluster, while ensuring that the units will give sufficient precision of indicators within the cluster. This assumes that variation within a cluster is smaller than variation between clusters. However, this aspect should be considered by each project as in some situations this may not be true.

Sample size calculations using any of these methods are usually based on population data from secondary sources such as a census or other studies. To identify actual units to survey, it is common to use community population rosters, registration lists, group membership lists etc.

Sampling and allocation to group

Innovation evaluations which compare intervention with control units need to ensure that every unit (household, actor, group etc.) is randomly assigned to intervention OR control, i.e. with equal probability. If the RCT is designed to represent a wider population then each unit (e.g. household, actor) must have an equal chance of being recruited into the study (also known as probabilistic sampling). This same principle applies for quasi-experiments or pure observational studies. For studies with multiple levels of hierarchy or stratification, ensuring this equal probability can be challenging and should be clearly documented in the protocol.

2.4 Calculating the indicators, data analysis and interpretations

Analysis options

In order to assess the effects and impacts of innovation-related interventions through VC and impact assessments, a well-constructed design will provide the most efficient contribution to a meaningful analysis. In the most extreme case, a classic RCT only requires a t-test of endline data to determine the impact of the treatment. Therefore, selecting treatment and control groups carefully, ensuring appropriate sampling and maintaining consistent interventions will allow for simple descriptive statistics to provide considerable insights.

However, in many cases the two groups (treatment and control) might not be completely identical at the beginning of the intervention. As a first step, baseline data will be collected and included in the analysis, assuming that the underlying development trend will be the same in both groups, even if their status is (slightly) different at the outset. This approach, called difference-in-differences, analyses the differences in outcomes between the two groups or includes the interaction term between point in time (survey round) and group membership (indicator of treatment/ control) to determine effects and impacts.

To further strengthen the robustness of the analysis where systematic differences between the groups are suspected (for instance, self-selection into the treatment group by survey subjects), specific variables can be included in the analysis which are known to have an effect on the outcome variable but not on group membership (instrumental variables). These variables can account for the additional variation introduced through any suspected bias. Furthermore, covariate or index based matching procedures which select similar subjects among the treatment and control subjects can also improve the robustness of estimating effects and impacts due to introducing the promoted innovations (e.g. propensity score matching).

The procedures are relevant for all VC nodes, although they generally require considerable sample sizes and are therefore more easily applicable to nodes with a large number of individuals. Therefore, assessments at producer and consumer levels are often easier and generally lend themselves most to these approaches.

For nodes with only a few individual participants, such as wholesalers or brokers, qualitative analysis approaches are more appropriate and can provide deeper insights.

2.5 Data management and sharing

Research activities should have a data management plan (DMP);[10] while a separate and detailed document may be needed for large, complex projects, it may be a section in an overall research protocol (see Template in Annexe 2).

Sharing of nonconfidential data must follow CGIAR policy; most CGIAR centres have adapted this policy, including partner centres of the CRP Livestock:

- ILRI: https://www.ilri.org/open
- ICARDA: https://www.icarda.org/about-us/open-access
- CIAT: https://ciat.cgiar.org/publications/open-access-at-ciat/

Note that the sharing of confidential data depends on the prior informed consent of project participants and project partner agreements. Even when permitted, it always requires signing of a nondisclosure agreement and no confidential data can be shared without this.

10 We recommend: Digital Curation Centre – Data Management Plan Content Checklist at http://www.dcc.ac.uk/sites/default/files/documents/templates/DMP_checklist.pdf.

2.6 Ethical considerations

Ethical approval, including prior informed consent, is required whenever research involves participants (e.g. interviews, biological samples from participants or their animals).

Testing and evaluating innovations involve the interviewing of individuals and groups (e.g. producers, input suppliers and other VC actors, extension officers, farmer groups etc.).

Users of this protocol should go through the appropriate institutional and/or country ethical review processes; e.g. ILRI scientists go through the Research Compliance Process which includes Institutional Research Ethics Committee (IREC), risk assessment for fieldwork and other elements which may be relevant to the study, e.g. Access and Benefit Sharing.

CRP Livestock researchers follow the ethical processes of their respective centres.

3 Opportunities for research on innovations for improved value chain performance

To stimulate the discussion on how to plan and implement innovations more consistently across the CRP Livestock and to improve opportunities for synthesis and comparative analysis, we have identified specific opportunities within the CRP's flagships. The number of innovations related to VCs currently being developed, piloted and scaled within the CRP Livestock is too many to be covered individually. However, the ToCs developed by each flagship within the CRP proposal provide a good overview of where the main value assessment opportunities can be found. These are mostly linked to relevant outcomes (behaviour changes associated with VC elements, such as business models and delivery systems) and assumptions (such as profitability of emerging enterprises, access to products and services, engagement of women in business).

It should be highlighted at this stage that the innovations being tested in the flagships other than LLAFS are generally not VC innovations. Nevertheless, achieving the flagship development objectives generally requires these innovations to be adopted and promoted through VCs and all flagship ToCs show delivery and VC elements in their last Cluster of Activity, the lowest in their ToC graph. The adoption of flagship innovations will only occur if these products or services provide benefits to all actors along the VC, leading to changes in VC performance. Therefore, VC assessments are well suited to test and document the success of these innovations through VC performance and livelihood indicators.

Each flagship identifies specific Domains of Change. Research on innovations for improved VC performance are most relevant for the 'Changes in markets, enterprises and consumer behaviour' domain. Details by flagship are provided in Box 5 while Annexe 1 presents the most relevant outcomes and assumptions from each flagship's ToC.

Box 5: Opportunities for research on innovations for improved VC performance, by flagship

Genetics

Of the proposed research outcomes in the animal genetics flagship, the innovative business models for delivery of improved genetics as well as the guidelines to establish improved institutional arrangements are assumed to have the greatest effects on livestock genetics VCs and are therefore suitable for VC assessment studies.

Similarly, the assumptions regarding private sector involvement, such as on new institutional arrangements, capacity building and cost effectiveness, would be well tested through VC assessments. Finally, the gender and age group aspects of engaging in genetics delivery and adequate input supply are linked to VCs and could be tested within this framework.

Health

The animal health flagship outcome most relevant for VC assessment is on the use of tested business models to deliver animal health products and services as this involves several actors along the VC (from input delivery to consumption by livestock keepers).

The assumptions which could be tested by VC assessments relate to the demand for products and services, including prices and volumes, and to the benefits generated by these products and services along the VC to ensure their sustainability. Determining the success and sustainability of emerging small scale businesses could also be accomplished by VC assessments.

Feed and forages

In the feed and forages flagship, the enterprise development models for improved supply of planting material as well as for feed processing are major outcomes for which VC assessments could provide important evaluation results. Within the flagship's ToC, this is split into two phases (testing and validating of business models, co-creation of enterprises). In addition, the adoption of promoted technologies by various VC actors provides an opportunity for testing the VC effects of these technologies.

The main testable assumption relates to market incentives for different VC actors to become involved with the promoted innovations.

Environment

Within the Environment flagship, only a few activities seem to be linked to VCs directly. However, payments for ecosystem services may well be integrated into VCs, so that their effects could then also be evaluated by VC assessments. This would be complemented by testing the VC-related assumptions, such as the attractiveness of environmental options for private sector investment and the social and economic feasibility and equitability of these environmental options.

LLAFS

Unsurprisingly, the LLAFS flagship offers a wide range of research issues which could be evaluated by VC assessments. VC innovations are a core component of the Cluster of Activities 4. Therefore, in this flagship, actual VC innovations will contribute considerably to the innovations tested by VC assessments (in contrast to the other flagships in which the innovations are mostly not directed at VCs).

The main outcomes provided by the flagship's ToC to be considered for VC assessments are:

i. gender transformative and youth supportive development approaches,

ii. innovative institutional arrangements to enhance nutritional improvements and

iii. adoption of institutional arrangements by livestock keepers (and other livestock VC actors) to enhance competitiveness and inclusiveness of VCs.

These outcomes rely on the assumptions (which could all be tested) that market structures will be improved, including by private investment, while demand is at least adequate, and markets are efficient enough to respond to changing environments (as determined by investments, policies and information).

The LLAFS flagship also provides the greatest opportunities for assessing VC interventions concerning their livelihood impacts. These will follow more specifically the classification of VC interventions and the selected indicators presented above apply.

4 Conclusions

This protocol has been developed based on the understanding that research activities could be implemented in such a way that they will have broader implications than the specific research questions they originally intended to address. To do so, the use of harmonized design and implementation frameworks increases both internal and external efficiency of research. This holds true not only for research on innovations for improved VC performance, but also for other multi-agenda research activities in the agricultural arena. On the other hand, this protocol is not meant to fit all research projects or intentions to draw broader lessons. Careful and context-specific adjustments need to be made to ensure that the additional effort in harmonizing is worthwhile.

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Annex

Annex 1: Most relevant outcomes and assumptions from each flagship's ToC

Note that opportunities for VC assessments focusing on livelihood indicators have not been highlighted in this section. For reference, we include relevant ToC outcomes and assumptions and the ToC graphs and tables per flagship. Outcomes and assumptions extracted from flagship ToC are relevant to VC assessment studies.

Genetics

Research outcomes:

Business models for multiplication and delivery of improved livestock genetics to resource poor women and men livestock keepers, implemented by national research and development partners, and the private sector.

Guidelines on policy and institutional arrangements for improvement and conservation of animal genetic resources adopted by national and development research partners, the private sector, and policy makers.

Assumptions:

- National research and development partners and the private sector agree on appropriate institutional arrangements to support the delivery of improved livestock genetics (A3).
- National research and development partners and the private sector invest in building capacity on delivery of improved livestock genetics (A3).
- National research and development partners and the private sector support the delivery of improved livestock genetics in a sustainable and cost-effective manner (A3).
- The engagement in the delivery of improved livestock genetics is attractive to women and youth (A3).
- Women and men livestock keepers can access the necessary inputs—in relation to animal health, feed and animal housing—required for the improved livestock to express its genetic potential (A6).
- Appropriate market incentives exist for the use of improved livestock genetics (A6).
- Improved livestock genetics continue to meet the needs and preferences of women and men livestock keepers and other actors along the livestock VCs.

Health

Outcomes:

- Government, development and private sector actors use tested business models to deliver products and services to livestock keepers.

Assumptions:

- Sufficient demand from farmers for services and products (A3).
- Animal health options generate sufficient benefits to attract private investors and emerging small-scale businesses are supported.

Feed

Outcomes:

- Inclusive business models for improved supply of forages and feed processing systems tested and validated by multiple partners.
- Co-creation of small- or medium-scale enterprises with development and private sector partners for decentralized feed processing, forage marketing or seed multiplication.
- Increased delivery and uptake of feed and forage technologies through proof of concept scaling, business model development and VC approaches, by development partners, the private sector (feed and forage traders, feed processors) and farmers.

Assumptions:

- Appropriate market incentives exist for different VC actors (A1, A2).

Environment

Outcomes:

- Communities pilot payments for ecosystem services

Assumptions:

- Private sector sees opportunities for investment (A6).
- Environmental options are also socially and economically feasible and equitable.

LLAFS

Outcomes:

- Local or national development partners adopt gender transformative or youth supportive approaches (using the evidence from the CRP).
- National and international development partners, government agencies and private sector invest and use the most successful institutional arrangements and behavioural approaches to enhance livestock mediated nutritional improvements.
- Livestock communities apply tested technologies, management strategies and institutional arrangements developed through system optimisation.
- Development partners, private sector and government agencies apply innovative institutional arrangements to enhance competitiveness and inclusiveness.

Assum*ptions:*

- More efficient market structures will be put in place (A9).
- Public and private partners are able and willing to invest in new institutional arrangements (A10).

- Demand for livestock and livestock products is adequate (A11).
- Market structures are adequately efficient to respond to changes in investment, policy and information (A12).

Annex 2: Research protocol content checklist

Study/research title

Short summary of the study being undertaken

Study leader(s) and key contacts

Name and contact details of person coordinating and leading the activities and responsible for delivery of study outputs; include other key contacts.

Study summary/description

Rationale/problem justification/background of study.

Aims and objectives/research questions/hypotheses being tested.

Study approach

- Research design (e.g. cross sectional, case study, cohort, experimental study etc.);
- Methodologies (quantitative, qualitative or mixed methods) and specific activities (e.g. household (HH) survey, focus group discussion, key informant interview, animal level measurements);
- Target population (who benefits);
- Study area/geographical cover (where);
- Sampling (sampling strategy including hierarchies and stratification, sample size and justification, sampling frames and units etc.) (example template: Annexe 2);
- Tools (type/list e.g. recording sheets, focus group discussion guides, HH questionnaire).

A summary of the red topics may be used to provide brief descriptions of the research, e.g. for abstracts of open-access datasets.

Implementation plan

- DMP (References: Annexe 1)

    Data manager: who is the manager who will oversee data management tasks?

    Data collection methods: how will data be captured?

    Data validation procedures/quality assurance

    Code book/variable description (separate protocol)

    Data access and sharing (metadata if separate protocol)

    Storage and backup procedures

    Archiving and preservation: where will data be archived?

- Training (for data collection/field staff)

  Team structure: how many enumerators; how many supervisors?

  Who will conduct training, when and where (include pre-test and review)?

  Training manual/guide

  Monitoring field work (monitoring data entry, quality checks)

  Documentation (decisions made during data collection, participant withdrawal/refusal and replacement)

- Analysis—methods to be used to analyse data (if type of analysis is clear from the start of the project)

Logistics/budget/calendar of activities

- Link to the study logistics and budget
- Start and end dates for specific components of activity

Research ethics/compliance

- Institutional Research Ethics Committee (IREC)/Institutional Animal Care and Use Committee/Institutional Biosafety committee clearance forms.
- Include research instruments (e.g. consent forms, questionnaires, interview guide and the research protocol)
- Research output dissemination plan

ISBN 92–9146–569–3

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