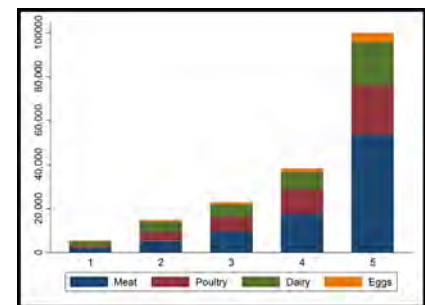# Measuring the Role of Livestock in the Household Economy

A Guidebook for Designing
Household Survey Questionnaires

Alberto Zezza, Ugo Pica-Ciamarra, Harriet K. Mugera,
Titus Mwisomba, and Patrick Okello

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ABOUT LSMS

The Living Standards Measurement Study (LSMS), a survey program housed within the World Bank's Development Data Group, provides technical assistance to national statistical offices in the design and implementation of multi-topic household surveys. Since its inception in the early 1980s, the LSMS program has worked with dozens of statistical offices around the world, generating high-quality data, developing innovative technologies and improved survey methodologies, and building technical capacity. The LSMS team also provides technical support across the World Bank in the design and implementation of household surveys and in the measurement and monitoring of poverty.

ABOUT THIS SERIES

The LSMS Guidebook series offers information on best practices related to survey design and implementation. While the Guidebooks differ in scope, length, and style, they share a common objective: to provide statistical agencies, researchers, and practitioners with rigorous yet practical guidance on a range of issues related to designing and fielding high-quality household surveys. The Series aims to achieve this goal by drawing on the experience accumulated from decades of LSMS survey implementation, the expertise of LSMS staff and other surveys experts, and new research using LSMS data and methodological validation studies.

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ABBREVIATIONS AND ACRONYMS

ASF/ASFs	Animal Source Food(s)
AU-IBAR	African Union Inter-African Bureau for Animal Resources
CAPI	Computer Assisted Personal Interviewing
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
GASL	Global Agenda for Sustainable Livestock
IFAD	International Fund for Agricultural Development
IHSN	International Household Survey Network
ILO	International Labor Organization
ILRI	International Livestock Research Institute
IPCC	Intergovernmental Panel on Climate Change
LID	Livestock in Development
LSMS	Living Standards Measurement Study
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MALF	Ministry of Agriculture, Livestock and Fisheries
NBS	National Bureau of Statistics
NSO	National Statistical Office
OECD	Organisation for Economic Co-operation and Development
SDG	Sustainable Development Goals
UBOS	Uganda Bureau of Statistics
UNCCD	United Nations Convention to Combat Desertification
UNIDO	United Nations Organization for Industrial Development
WHO	World Health Organization

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EXECUTIVE SUMMARY

This Guidebook presents a module template for effectively including livestock in multi-topic and agricultural household surveys in low- and middle-income countries. It is a practical tool for survey practitioners—including Bureaus of Statistics, ministries responsible for livestock, and non-governmental and civil-society organizations, regional institutions, international organizations, the private sector, and other stakeholders—to collect data on the role of livestock in the household economy and its contribution to livelihoods. The data will assist in generating statistics on key features of the smallholder livestock sector—from herd size and composition to husbandry and production practices, from meat, milk, and egg production to livestock income. These statistics represent the backbone for effective livestock-sector policies and investments.

In most low-and middle-income countries, information on livestock is scant at best, and when available it is often inaccurate, preventing stakeholders from tapping into the many development opportunities that livestock provide. It is estimated that 60 percent of rural households in low-and middle-income countries depend on livestock for their livelihoods; livestock is one of the fastest growing agricultural sectors, and is anticipated to become one the largest contributors to agricultural value added. Sustainable livestock systems can contribute to alleviating poverty and ending hunger, and to improving food security, nutrition, and health. They also have complex interactions with ecosystems and are part of the equation when it comes to addressing environmental degradation and climate change, and preserving biodiversity.

The livestock module template is a systematic attempt to provide guidance to stakeholders responsible for collecting data on livestock at the household level. It builds on a variety of multi-topic household survey questionnaires and agricultural/livestock survey questionnaires implemented in low- and middle-income countries, as well as on lessons drawn from the implementation of comprehensive livestock questionnaires in the context of multi-topic household surveys in Niger, Tanzania, and Uganda—including data validation, analysis, and interpretation with expert informants.

The main objectives of the livestock module are to:

   a. Generate basic statistics on key livestock-related variables, such as livestock ownership and access to animal health services;
   b. Measure the contribution of livestock to the household asset base;
   c. Measure the cash and in-kind income from livestock;

The livestock module elicits information in the following domains:

   a. Livestock ownership by indigenous/local and improved/exotic breeds;
   b. Change in stock over the reference period—due to birth, purchase, sale, disease, slaughter (meat production), and other reasons;
   c. Breeding, housing, watering, and feeding practices and labor inputs;
   d. Animal health, including major diseases and preventive and curative treatments;
   e. Milk production, including sale and own-consumption;
   f. Egg production and sales;
   g. Animal power, both for draft power and hauling services;
   h. Dung, including its different uses.

Having information on production and inputs and the associated values allows for the computation of a measure of income from livestock which, in the context of a full household survey, makes it possible to quantify the role of livestock in the household economy, and examine how different socio-economic profiles engage in the sector.

One aspect that cuts across domains is the gender dimension. Livestock ownership; management tasks; and the production, handling, and sale of different livestock products are often organized within the household, with a division of roles along gender lines that can be captured only by explicitly taking gender into account at the survey design stage.

Finally, the information collected via the livestock module can be used in combination with the information collected in a survey's food consumption module to understand the role of animal source foods in household food consumption, including their types, quantity, and origin. Animal source foods can contribute to addressing or exacerbating malnutrition problems, whether related to undernutrition, micronutrient deficiencies ('hidden hunger'), or overweight and obesity.

Recognizing that different stakeholders have different priorities in terms of what they need to measure, monitor, and analyze—and that they face different constraints in terms of implementation—the questionnaire comes in three forms.

The first is a short version of around 30 questions that focuses on the basic characteristics of the herd, computing a measure of livestock income and some limited information on livestock production and constraints. The second is a standard version of about 100 questions that has more detail on all of the above, and collects additional information on animal husbandry practices and livestock services and on the individual roles of household members with respect to some key aspects of livestock management. The third is an extended version (available as an online annex on the LSMS website, www.worldbank.org/lsms) of around 170 questions that collects more detailed information on all of the above. An enumerator manual is also available online.

In all cases, users should consider the three questionnaires as templates that can be expanded, reduced, and adjusted to meet specific data and statistical needs. This is essential for developing survey questionnaires that collect livestock data that effectively respond to the information needs of livestock stakeholders.

1. Introduction

This Guidebook presents a livestock module template for inclusion in multi-topic and agricultural household surveys in low- and middle-income countries. Its aim is to provide decision makers and survey practitioners—including Bureaus of Statistics, ministries responsible for livestock, non-governmental and civil-society organizations, regional institutions, international organizations, the private sector, and other stakeholders—with a flexible tool to collect data on the role of livestock in the household economy and its contribution to livelihoods. The data will assist in generating statistics on key features of the smallholder livestock sector: herd size and composition, production and husbandry practices, access to and utilization of services and markets, consumption of animal source foods, livestock income, and constraints to livestock development.

Guidelines and tools for collecting livestock data at the household level are in high demand, for two complementary reasons. First, livestock is currently one of the fastest growing agricultural sub-sectors in low- and middle-income countries and is expected to become the largest contributor to agricultural value added in the coming decades. Secondly, livestock have often been neglected in national statistical operations, with the result that it is difficult for decision makers in most countries to access sufficient high-quality information to design evidence-based, livestock-sector policies and investments. Collecting high-quality data on the livestock sector that are representative of the country as a whole and of its major areas remains difficult and relatively costly to undertake. However, the implicit costs of not collecting such data have never been higher given the increasing role of the sector in the economy, in people's diets, and its potential to contribute to the Sustainable Development Goals (SDGs).

This Guidebook is structured as follows. Section 2 focuses on the importance of livestock to achieving the SDGs, and on the limited information currently available for policy makers and stakeholders to make decisions promoting the sustainable development of the sector. Section 3 presents the current state of affairs with regard to the coverage of the livestock sector in multi-topic living standard surveys, which are widely recognized as an effective tool to measure and understand the determinants of poverty and well-being. The overall goals of the proposed livestock module template[1] are outlined in Section 4, while Section 5 describes in more detail the rationale and objectives of the main proposed data-collection domains. Section 6 walks the reader through the specifics of the proposed questionnaire. A short synthesis of the Guidebook and concluding remarks are presented in Section 7. The standard version of the proposed module template (which embeds an option for a short version) forms an integral part of this Guidebook and is provided as an Annex. An extended version of the module is provided as an online Annex (available at www.worldbank.org/lsms).

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1 We use the terms 'module' and 'questionnaire' interchangeably here. In practice, "questionnaire" is generally used to mean a stand-alone survey instrument, while "module" is used to identify one part of a larger questionnaire. The livestock module template presented here can be implemented as a stand-alone questionnaire (but integrated in a survey that includes other questionnaires), or as a module in an agricultural questionnaire that includes other modules (e.g. crop, fishery, and forestry).

2. Livestock: A Critical Sector for the SDGs but Starved for Information

In September 2015, the General Assembly of the United Nations adopted the 2030 Agenda for Sustainable Development. The Agenda "*is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom. [Member countries] recognize that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development*" (UN, 2015). The Agenda comprises 17 goals, including "ending poverty in all its forms everywhere" through "achiev[ing] gender equality and empower[ing] all women and girls" and "tak[ing] urgent action to combat climate change and its impacts."

Sustainable growth of the livestock sector can support the achievement of several SDGs, since farm animals provide a wide spectrum of benefits to society (GASL, 2016). These include revenue and employment, food and nutrition, manure, draft power and hauling services, savings and insurance, and environmental and health services. Table 1 includes a list of possible linkages between the SDGs and livestock-sector issues.

Ensuring that livestock sector growth (as mentioned in the paragraph above) can contribute to the SDGs requires that policy makers have access to a regular flow of data and statistics to inform decision-making processes. They need data to:

- appreciate the returns on livestock investments with respect to poverty reduction, food security, and other socio-economic goals;

- identify the binding constraints that prevent the sector from developing, such as seasonality in pasture availability and widespread animal diseases;

- identify the determinants or root causes of the binding developmental constraints, such as inadequate irrigation infrastructure or lack of a cold chain;

- design interventions that, by targeting the determinants of the development constraints, aim to support the sustainable development of the sector;

- monitor and evaluate the implemented policies and programs.

Table 1 — Livestock and SDGs Linkages

SDGs	POTENTIAL ROLE OF LIVESTOCK
1. No poverty	There are 900 million poor people worldwide (World Bank, 2016); about half of them fully or partly depend on livestock for their livelihoods (Robinson, 2011) Policies and investments that increase livestock productivity can directly improve the well-being of about half of the world's poor
2. Zero hunger	Animal-source foods are energy dense and are a rich source of micronutrients, and thus are particularly important in the diet of pregnant women and babies (Randolph et al., 2007) Policies and investments that promote even modest consumption of animal source foods among the malnourished and the vulnerable population have a strong impact on nutrition levels
3. Good health and well-being	61% of animal diseases are zoonotic (affecting humans; Oxford Analytica, 2012) and animal-food safety hazards and antimicrobial resistance are a growing concern for human health (FAO, 2013a) Policies and investments targeted toward improved animal health and biosecurity along the livestock value chain contribute to good health and well-being
4. Quality education	Healthy food and improved nutrition have positive effects on child well-being, enhance learning ability, and improve school performances (WHO, 2006) Policies and investments that support adequate consumption of animal source foods by children of school age improve the quality of education
5. Gender equality	There is a major gender gap in livestock assets, with female-headed households significantly keeping fewer animals than male-headed ones (FAO, 2011a) Policies and investments that reduce the livestock gender gap not only empower women but also contribute to raising agricultural outputs and reducing poverty.
6. Clean water and sanitation	Livestock use 29% of the total agricultural water footprint (Mekonne & Hoekstra, 2012). Most of the water used by livestock returns to the environment: part is reusable, part is polluted or evapotranspired and, hence, is depleted Policies and investments to improve management of water in livestock systems contribute to clean water and reduce public health risks (e.g., waterborne diseases)
7. Affordable and clean energy	As part of the carbon cycle, livestock are not only a sink but also a source of energy. Recycling energy from animal manure through anaerobic digestion, for example, is an alternative to fossil fuels or firewood (FAO, 2013b) Investments that enhance the positive contributions of livestock in the carbon cycle contribute to both affordable and clean energy
8. Decent work and economic growth	In 2015, the number of unemployed people reached 197.1 million (ILO, 2016); 470 million jobs are needed for new entrants to the labor market between 2016 and 2030 worldwide (UNDG, 2013) "The demand for animal protein drives the global food markets" (OECD/FAO, 2015), which creates major business opportunities for the sector. Labor policies and related investments along the livestock value chain can generate millions of on-farm, off-farm, and non-farm decent jobs
9. Industry, Innovation and Infrastructure	In many low- and middle-income countries, the livestock industry is constrained by a lack of processing infrastructure, such as slaughterhouses and tanneries: barely 30% of agricultural production undergoes industrial processing (UNIDO, 2013) Policies and investments that support small- and medium-sized livestock enterprises that engage in industrial processing (and manufacturing) are critical for the early stages of industrialization and are often large job creators
10. Reduced inequalities	The largest share of the world's poor lives in rural areas, and half of the poor keep livestock (World Bank, 2016; Robinson, 2011) Policies and investments that ensure that poor livestock keepers get access to basic production inputs and to productivity-enhancing technologies support equal opportunities and reduce inequalities within and between countries
11. Sustainable cities and communities	Half of humanity—3.5 billion people—lives in cities today (UN, 2014). Rapid urbanization is exerting pressure on fresh water supplies, sewage, the environment, and public health Policies and investments that support livestock-based rural industrialization reduce population pressure on cities and ensure the provision of affordably priced animal source foods for urban dwellers

Table 1 — Livestock and SDGs Linkages (cont)

SDGs	RELATED LIVESTOCK SECTOR POLICY ISSUE
12. Responsible consumption and production	Each year, an estimated one-third of all food produced ends up spoiled due to poor transportation and harvesting practices, or because it rots in the bins of consumers and retailers (FAO, 2011b)
	Policies and investments along the livestock value chain can significantly reduce food waste, particularly given the high perishability of many livestock products
13. Climate action	From 1880 to 2012, the average global temperature increased by 0.85°C, with negative impacts on grain yields and livestock productivity: for each 1 degree of temperature increase, grain yields decline by about 5% (IPCC, 2014).
	Since the livestock sector contributes 14.5% to total anthropogenic greenhouse gas emissions (FAO, 2013b), investments and policies that improve efficiency in the sector can significantly contribute to climate change mitigation
14. Life below water	Oceans cover three-quarters of the Earth's surface. As much as 40% of oceans are heavily affected by human activities, including land-based activities, marine debris, and nutrient pollution (Halpern et al., 2008)
	Policies and investments that support sustainable livestock production and integrated livestock–fish farming systems reduce marine pollution and support the livelihoods of millions of people depending on marine and coastal resources for their livelihoods
15. Life on land	52% of agricultural land is moderately or severely affected by soil degradation (UNCCD, 2016); 22% of the 8,260 known animal breeds are at risk of extinction (FAO, 2013c)
	Policies and investments in the livestock sector contribute to reducing soil degradation (e.g., through the use of manure) and sustaining biodiversity since livestock keepers are "guardians of biodiversity" (FAO, 2009; FAO 2013b)
16. Peace, justice and strong institutions	Institutions are fundamental determinants of long-term growth (Acemoglu et al., 2005). In the livestock sector, inadequate land-related institutions (e.g., property rights) are a major determinant of violence and conflicts (Pica-Ciamarra et al., 2007)
	Policies and investments that sustainably increase livestock production improve farmers' livelihoods and mitigate the root causes of some conflicts, particularly in arid and semi-arid areas
17. Partnerships for the goals	A successful sustainable development agenda requires partnerships between governments, the private sector, and civil society
	The Global Agenda for Sustainable Livestock is a partnership of livestock-sector stakeholders committed to the sustainable development of the sector. It builds consensus on the path toward sustainability and catalyzes coherent and collective practice change through dialogue, consultation, and joint analysis.

However, available data on livestock are largely insufficient to formulate and implement the necessary public- and private-sector investments for livestock-sector development, which makes it difficult to tap into the sector's potential contributions to the SDGs. A review of major databases targeting livestock (Perry & Scoones, 2009) concluded that "*often available data is not adequate to answer the questions being raised or to allow optimal targeting or design of interventions. Available data is patchy, often old, disparate, scattered and hard to combine and pull together. Even seemingly mundane and basic data, such as accurate estimates of the number of poultry in a country, are often unobtainable, let alone more complex questions such as what is the impact of a given disease.*"

Estimates of livestock numbers are one of the core indicators for decision makers to design, implement, and monitor interventions in the sector. However, estimates on the number of live animals are often inadequate in low- and middle-income countries. For example, a review of year-to-year growth rates in large and small ruminant numbers from 1990 to 2010 (as obtained from FAOSTAT in 14 West African countries) identified 31 instances of a year-to-year growth rate of more than 10 percent, and 28 instances of three-year or longer periods in which the animal population grew at exactly the same rate (Pica-Ciamarra et al., 2014). That is an indication that missing and unreliable data make it challenging to generate accurate statistics even for core livestock indicators.

Estimates of the number of poor livestock keepers is another critical indicator for designing interventions in the sectors that target SDG1. However, there are currently no robust statistics on the number of poor livestock keepers, which makes it difficult to monitor if and how investments in livestock can contribute to SDG1. In 1999, the Livestock in Development (LID) program produced a report on

'Livestock in Poverty-Focused Development.' It estimated that about 70 percent of the rural poor—about 970 million people—were dependent on livestock for part of their livelihoods (LID, 1999). Ten years later, the Food and Agriculture Organization of the United Nations (FAO)'s *State of Food and Agriculture: 'Livestock in the Balance'* (FAO, 2009), which focused on the livestock–poverty equation, still had to rely on the table produced by LID a decade earlier, clearly illustrating that livestock poverty data are not updated regularly.

When looking at national statistical systems, which are expected to generate data on livestock, the following observations emerge:

- There exists a variety of livestock-related indicators at country level, including figures on animal numbers, meat and dairy production and consumption, and trade flows of a number of raw and processed livestock products (e.g., FAOSTAT, 2013; WAHIS, 2013). However, the quality of the available data is often questioned by livestock stakeholders, even for the most basic indicators such as livestock numbers.

- Nationally representative household, agricultural, and/or farm surveys—which are more or less regularly undertaken by national statistical authorities—tend to marginally appreciate livestock. The survey questionnaires contain only a few, if any, livestock-related questions, mainly focusing on the number of animals owned and value of production. These surveys, therefore, do not currently lend themselves to generating comprehensive information on farm, non-farm, and off-farm livestock-related activities (e.g., livestock trade), which is much needed by policy makers.

- National governments rarely undertake specialized livestock surveys, which typically target technical issues such as animal breeds, feed, animal diseases, meat production, etc. in order to better understand the determinants of livestock production and productivity. These specialized surveys represent a critical input for the design of effective policies and investments at farm level.

- National governments regularly collect data on animal diseases. However, the quality of the collected data, including their timing and accuracy, is uncertain. This limits the capacity of the government to effectively control and manage the spread of diseases, including zoonoses.

- National governments rarely if ever complement official statistics by collecting data and information to understand the determinants of livestock developmental constraints and to identify appropriate interventions to address those constraints. In other words, they rarely collect data that will help them move from statistical analysis to action on the ground.

- Finally, all sources of livestock data and statistics—such as agricultural censuses, livestock censuses, periodical and ad hoc agricultural sample surveys, and household income or expenditure surveys—rarely if ever generate comprehensive information on pastoral production systems, which are of considerable relevance to many countries.

In summary, livestock data are not widely or consistently collected by national governments, and the quality of available data with respect to its timeliness, completeness, comparability, and accuracy is mixed. This makes it difficult to design and implement effective investments and policies for the development of the sector.

3. Livestock in Multi-Topic Household Surveys

Livestock data can be sourced from a variety of surveys, including agricultural and livestock censuses; farm, agricultural, and livestock sample surveys; household income and expenditure surveys; living standards or multi-topic household surveys; and administrative records. Other possible sources are population and housing censuses, labor force surveys; and service delivery surveys (Pica-Ciamarra et al., 2014).

Multi-topic and other integrated surveys such as the Living Standard Measurement Study (LSMS) surveys aim to not only generate indicators and provide the opportunity to monitor them over time, but also to foster a better understanding of how different aspects of household livelihoods relate to each other and result in different welfare and development outcomes for different socio-economic groups. In particular, multi-topic household surveys aim to:

- Measure poverty and well-being and understand their major determinants;

- Provide evidence for planning, monitoring, and evaluating economic policies and social programs in relation to their impact on household living standards, especially those of the poor.

Integrating information on livestock with other aspects of the household economy allows decision makers to design and implement investments to maximize the contribution of livestock to poverty reduction and other socio-economic objectives.

Typically, LSMS surveys are nationally representative, and are also representative of at least some of a country's regions or macro regions. The sample size can vary from roughly 2,000–3,000 households to about 20,000 households, but is generally kept below 8,000 to allow a tighter grip on the data quality-control process. The surveys are conducted through face-to-face interviews, increasingly with the use of Computer Assisted Personal Interview (CAPI) technologies, and generally cover a reference period of 12 months. LSMS surveys are implemented by National Statistical Offices (NSOs), often with support from the World Bank and other development partners. Questionnaires are designed with inputs from a data user group, which includes key line ministries and other stakeholders interested in obtaining information from the survey. For a well-designed livestock module to be implemented, it is important for livestock stakeholders to come forward to share their expertise and play an active role in the survey preparation. This Guidebook aims to equip livestock stakeholders with a tool to engage in that process.

A distinctive feature of LSMS surveys is their inclusion of several questionnaires that target information at the individual, household, and community levels. They include a household questionnaire, a community questionnaire, a price questionnaire, and, in some cases, questionnaires on agriculture, gender, and fisheries. The household questionnaire is made up of sections on education, health, employment, assets, income sources, and more. Information on agriculture is often collected via a section in the household questionnaire, but it is sometimes collected via a separate questionnaire, which includes modules on crop production, agricultural labor, the use of inputs and extension services, and some questions on livestock. The community questionnaire targets information on local infrastructure, availability of public services, and distances to major markets—in general, information that is expected to vary across communities rather than across households within a given location.

The coverage of livestock in the household questionnaires of LSMS surveys is generally limited to a few questions on (a) livestock ownership, sometimes with details on herd dynamics (animals born, death, lost, etc.) over the survey reference period, usually one year; and (b) consumption of animal products,

including own-consumption and market purchases. The number of livestock-related questions of the first type (on livestock ownership) in a sample of 97 household survey questionnaires available on the website of the International Household Survey Network (IHSN, www.ihsn.org) is a revealing indicator of the limited availability of data by which to fully appreciate the role of livestock in the household economy. In almost 80 percent of the sample countries, the survey questionnaires include less than 15 livestock-related questions. This data is thus all but insufficient for appreciating and understanding the role of livestock in the household economy. Increasing the coverage of livestock in household surveys has the potential to yield badly needed information for quantifying the contribution of livestock to household livelihoods, including both its monetary and non-monetary value.

Amid the growing recognition in recent years of the role of agriculture for livelihoods, poverty reduction, and economic growth, the agricultural section of LSMS surveys has been expanding its coverage, including its livestock content. Recent LSMS surveys in Niger (République du Niger, 2010), Tanzania (NBS, 2012a), and Uganda (UBOS, 2011) include specific modules on livestock, or a stand-alone livestock questionnaire. These modules and questionnaires were developed by NSOs and other country stakeholders in consultation with African Union–Interafrican Bureau for Animal Resources (AU-IBAR), FAO, the International Livestock Research Institute (ILRI), and the World Bank. In Niger, Tanzania, and Uganda, the following process was followed in developing the livestock section of the questionnaires:

- First, a variety of multi-topic household survey questionnaires and agricultural/livestock survey questionnaires implemented in low- and middle-income countries was collected. Survey questionnaires are often included as appendices of statistical reports or are sometimes available on NSO websites; some are also made publicly available by the International Household Survey Network.

- Second, a production function approach was used to identify the information set needed to provide a satisfactory picture of the livestock sector. This involved systematizing all inputs and outputs associated with animal keeping, such as feed, water, animal housing, animal health, animal slaughtering, milk production, and marketing.

- Third, working groups were formed around each component of the production function and tasked to identify a set of questions to possibly include in agricultural and integrated household surveys, using the collated questionnaires as a starting point. No upper limit was set to the number of

questions to propose, but the scope, content, and typical length of agricultural/livestock and integrated household survey questionnaires were illustrated to group members.

- Finally, the national statistics authorities, the ministries responsible for livestock, and other stakeholders agreed upon a livestock module to include in the nationally representative surveys.

Besides the information on livestock ownership, herd dynamics, and consumption of animal source foods typical of most LSMS surveys, these modules also solicit information on:

- Breeds, differentiated by local/indigenous and improved/ exotic;

- Use of inputs, such as feed, water, labor, vaccines, dewormers, housing systems, etc.;

- Access and utilization of services, such as breeding, animal health, and marketing services;

- Production of livestock products, including not only meat, milk, and eggs, but also dung and other services provide by livestock, such as draft power and transport.

The governments of Niger, Tanzania, and Uganda have all made ample use of the livestock data generated from these surveys, with the Ministries of Livestock in the three countries producing reports on their smallholder livestock sectors (Bocoum, 2014; MAAIF, 2016a; MALF, 2016). These reports present information that would otherwise be lacking and not available to decision makers. They include statistics on herd dynamics (e.g., animals lost due to theft, disease, and other reasons, or animals acquired due to birth, purchase, and gift); on prevailing production and husbandry practices (e.g., breeding, feeding, vaccination); on utilization of livestock services, by both type of service and by service provider; and on access and utilization of livestock markets; among others. The reports also allow for the characterization of key features of the livestock sector according to how these features vary across socio-economic groups (e.g., by level of income or wealth, or by region). More importantly, this information is currently feeding into policy processes aimed at improving the system of animal health services (MAAIF, 2016b; MALF, 2105). However, the Niger, Tanzania, and Uganda LSMS surveys are an exception, since most countries still do not include an expanded livestock section in their multi-topic or agricultural surveys. This Guidebook aims to document the lessons learned through the experience with the Niger, Tanzania, and Uganda surveys and provide the wider livestock community of practice with a tested survey instrument for integration into future surveys.

4. A Livestock Module for Multi-Topic and Agricultural Household Surveys

Building on the experience in these countries and with the objective of increasing the quantity and quality of livestock data available to decision makers, the World Bank and FAO joined forces with ILRI and AU-IBAR to develop a livestock module template for household surveys. This Guidebook is the result of that effort. It includes short, standard, and expanded versions of the questionnaire. The three versions are similar in approach, different in the level of detail that can be gauged from each, and have four common objectives:

- To generate basic statistics on key livestock-related variables, such as livestock ownership and access to animal health services;

- To measure the value of household livestock, which are an important economic asset;

- To measure the cash and in-kind income from livestock;

- To characterize household livestock husbandry and production practices.

The module solicits information in three major domains: livestock ownership, livestock inputs (such as husbandry practices), and livestock outputs. Table 2 illustrates the coverage of these three broad domains, and how they appear in relevant questionnaire sections in the livestock module. The detailed contents of the questionnaire under each domain will be discussed in the next section. Having information on production and inputs and the associated values allows for the computation of a measure of income from livestock which, in the context of a full household survey, makes it possible to quantify the role of livestock in the household economy and examine how different socio-economic profiles engage in the sector.

One aspect that cuts across domains is the gender dimension. Livestock ownership; management tasks; and the production, handling, and sale of different livestock products are often organized within the household, with a division of roles along gender lines that can only be captured by explicitly taking gender into account at the survey design stage.

Finally, information on the role of animal source foods in household food consumption and their types, quantity, and origin is needed to understand how these products can contribute to addressing or exacerbating malnutrition problems, whether related to undernutrition, micronutrient deficiencies ('hidden hunger'), or overweight and obesity. It also allows for an examination of the demand for animal source foods (ASFs) and how that demand varies across socio-economic groups and over time. Most of this information is usually captured by the food-consumption module of the surveys, but part may fall within the production sections if questions are asked about the disposition of livestock products, including own consumption.

Not all users of the livestock module will be looking for the same amount of detail, or will have the resources to collect the same amount of information. Survey designers are expected to build their own module that adapts to a country's livestock sector, including its management practices and structural and transitory features, taking into consideration the specific constraints within which each survey operation takes place.

Users of the module should be aware that the module is designed for household surveys whose reference population is a country's general population, and that use a population-based frame for sampling. It is important to acknowledge two key limitations that come with this focus. First, the

Table 2 —Content of Livestock Module for Multi-Topic Household Surveys

Livestock domain	Sections	Remarks
Livestock ownership	Number of animals Change in stock in past 3 or 12 months	Questions are asked for individual animals, often differentiated by age, sex, and breed (local/indigenous and improved/exotic), which helps to appreciate herd structure and inter-species composition
Inputs and husbandry practices	Breeding Feeding Watering Animal health Housing Hired labor	Questions are asked for major groups of animals (e.g., large ruminants, small ruminants, pigs, poultry birds, equines, other), as management practices usually do not differ between animals of the same species
Outputs	Egg production Milk production Animal power Dung	Questions are asked for major groups of animals, including both the monetary and non-monetary value of production

module is not intended to capture the specificity of the corporate portion of the livestock sector. Second, the module is not designed to capture nomadic and semi-nomadic populations. The reasons for this are largely related to sampling. Corporate livestock farms fall outside of the frame of a population-based frame, where the unit of analysis is the household. Pastoral households do fall within the scope of population-based sampling, but will in most countries represent a small proportion of the general population and will therefore not enter the sample in sufficient numbers for meaningful analysis to be carried out. There are of course countries were pastoralism is prevalent enough that the survey may capture a substantial number of pastoral households. However, since the questions of relevance for pastoral and sedentary livestock keepers are likely to be different, the decision was taken for this Guidebook to limit the scope to sedentary livestock keepers.

With these considerations in mind, the livestock module for agricultural and multi-topic household surveys is presented here in three versions (short, standard, and extended) that can be used as starting points for developing questionnaires that fit the needs of a specific country or study. Users are expected to use the version most suitable to their needs, or to customize their questionnaires by combining elements of the different options.

Short version

The short version of the module includes questions on livestock rearing by species (e.g., cattle) and type of animals within species (e.g., bulls, steers, cows), as well as a question on the major purpose in keeping animals, such as for food consumption, insurance, cash income, or other. It asks about sale of animals by species over the reference period, which is 12 months for large and medium animals (e.g., cattle, sheep, goats) and 3 months for small animals, namely short-cycle animals (e.g., chicken, ducks, rabbits). It includes some questions on milk and egg production, and a few questions on husbandry practices and animal health. The latter questions target animal vaccination, which in many countries is provided for free or is subsidized by the public sector, and constitutes a large part of the program of the Ministry responsible for livestock.

The short version of the module allows for the fairly accurate quantification of a household's livestock wealth, and hence the classification of households into different types with respect to livestock assets; it also provides a rough measure of the cash income derived from livestock. It does not provide a comprehensive picture of husbandry and production practices. This version comprises about 35 questions and is intended for use in surveys for which livestock is of relatively minor interest.

Standard version

The standard version of the module collects a substantial amount of livestock-related information, including ownership of animals, inputs and husbandry practices, and livestock outputs by product, by-product, and service, such as milk, manure, and draft power. As in the short version, questions on livestock ownership target species and types of animals; while all other questions only ask about animal species, such as large ruminants, small ruminants, and equines.

Questions on changes in animal stock over the reference period collect information on the causes of herd reduction/expansion, including purchases, sales, slaughters, gifts, and loss of animals. Questions on inputs and husbandry practices target housing and breeding practices; access to and use of water and forage/feed; and animal health, including vaccination, treatment against external and internal parasites, and treatment of sick animals.

Finally, questions on outputs ask not only about meat, milk, and egg production, but also about the use of animal power (draft and transport services) and the production of dung, mainly but not only, used as manure. Most sub-sections include questions on the use of family labor by gender, and on the non-family labor hired for raising animals.

The standard version of the module supports the generation of descriptive statistics for key livestock-related variables, for which nationally representative indicators are often unavailable. Examples include ownership of exotic breeds, prevailing breeding practices, and access to veterinary services. It also allows for the accurate quantification of not only a household's livestock wealth, but also the contribution of livestock to household livelihoods, including both their monetary and non-monetary value. The standard version of the module comprises about 100 questions.

Extended version

The extended version of the livestock module includes all the questions in the standard version, plus additional information in all sub-sections. In particular, it allows for the differentiation between animal ownership and animal keeping, as not all households owning livestock raise them on the farm; includes questions on the providers of goods and services, such as the public and private sector and non-governmental organizations (NGOs); and asks details about the role of family members in selling animals and livestock products, including who controls the earnings.

The extended version of the module allows for the generation of key livestock statistics and for analyses similar to that of the standard version, but with higher accuracy. It is a long and substantial version and, as such, it should be seen as a rotational module that country governments implement only when they need comprehensive and detailed information on livestock, most likely for a specific sub-sample of the population (e.g., cattle keepers). In response to specific information needs, however, survey designers may wish to include only one or selected sub-sections of the expanded version of the module in their survey questionnaires, such as those on breeding and animal health. The extended version of the module comprises about 170 questions.

5. Key Domains of the Livestock Module

Livestock as Productive Assets: Herd Size and Composition

Livestock are live assets, often held by poor people, fulfilling multiple economic, social, and risk-management functions. Collecting data on herd and flock size and their structures is important, as the number, sex, and age of animals owned or managed offers the first basic indication of the potential for livestock to generate income, and provide food and other goods and services. Since livestock are an important asset and a reserve of value that can be monetized when necessary, this information also contributes to the valuation of the wealth and natural capital of households (or the computation of wealth indexes), and of their ability to cope with risks.

At a minimum, information should be collected on the number of animals owned by species—such as cattle, sheep, goats, chicken, pigs, etc.—on a given date (the day of the interview, or some other pre-determined date), with the exact list of animals varying by country. In most cases, it will be important to break down the list so that within each species, data is collected on the sex and main age groups of the animals (e.g., cattle including bulls, cows, oxen, steers, heifers, male calves, female calves).[2] This information allows for the calculation of "state variables" for the herd, the herd size, and its sex-and-age structure (Lesnoff et al., 2011). Obtaining this type of disaggregated information also makes it easier and more meaningful to collect information on animal graduation into the next age category (e.g., from heifer to cow) and on transactions (sales and purchases), since values vary markedly with the age class and sex of the animal. Asking respondents to report collectively on sales of, say, cattle,

leads to a more cognitively burdensome process since they need to sum the value of animals with very different prices. The disaggregated information also allows for the calculation of unit values for the different animal types and thus, a more accurate valuation of the household's herd than if a coarser level of aggregation is used.[3]

It is also useful to collect information on the grade of the animals since that provides an indication of their overall health and will be reflected in their market value. However, grades are often not standardized within and between countries and, unless there is a robust method for collecting information on grade (such as by showing animal pictures to farmers), it could be challenging to arrive at accurate statistics. Collecting some synthetic information on the breed of the animals (for instance, differentiating between indigenous/local as opposed to improved/exotic breeds) is recommended. This information is important since, when correlated with inputs utilization, production level, and livelihoods parameters, it can help identify constraints and opportunities for improving the contribution of livestock to household livelihoods. This might be a variable of interest for understanding how exotic breeds are distributed within a country across space, or across different household types, and how improved breeds may (or may not) be contributing to higher productivity, or may (or may not) be helping households alleviate specific constraints to livestock-rearing activities. When improved breeds are common and are of particular interest for livestock policy or service delivery, surveys may opt to collect information on exotic and local breeds separately. When that is not the case, it may suffice to include in the survey one question on

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2 The module template has a fairly detailed list of livestock, which is offered as an example. Users will have to tailor the list to their needs, both in terms of species (relevant species will vary by geographic area) and in terms of age and sex disaggregation (some users may be content to have data on bovines, or large ruminants; others may need a disaggregation by species, age, and sex categories).

3 In subsequent modules, the information is collected at a more aggregated animal group level, since it is not necessary or desirable to ask all question separately for animals within the same herd or flock.

the number or proportion of animals of each type that are local, exotic, or mixed breed.

In collecting data on herd or flock structural parameters, in addition to numbers of animals in the herd at a given time, it is useful to collect data on changes in herd size over the survey reference period, and on the reasons for those changes. This implies collecting information on animal births, deaths, sales, slaughters, purchases, and gifts made or received. Such data allow for insights into patterns of intake, offtake, and graduation of animals, as well as information on the cash flow from the sale and purchase of animals, and on how households dispose of different animal types, whether by selling them as live animals or by slaughtering them for sale or own consumption. In some instances, livestock destocking may occur as a coping strategy in response to a shock. Combining this information with information from other sections of a questionnaire (such as the shock module) or with spatial data (e.g., on rainfall and temperature) allows for an examination of the relationship between vulnerability to risks and livestock ownership. Data on purchases and sales of live animals, when complemented with information on the value of such transactions, will also allow for the derivation of location-specific unit values that can in turn be used for valuing the stock of animals held by different households. The module also suggests collecting the households' subjective perceptions on their main motives for raising livestock.

Since the productive cycles of the animals differ, questions targeting ownership change in stock of different species of animals have different recall periods. For large and small ruminants, a 12-month recall period is recommended; while 3 months is recommended for poultry such as chicken and ducks. An alternative would be to allow a 6-month recall period for small ruminants (goats and sheep) and pigs, but this would make the structure of the module more cumbersome and has therefore been avoided here. There are different recall periods because it is general survey practice to adopt longer recall periods for less frequent events, and shorter periods for more frequent events.[4] The gestation periods of large ruminant, small ruminant, and poultry are 250-300 days, 140-160 days, and a few weeks, respectively, and the production and sale cycle are in many ways related to those periods.

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[4] For instance, in the collection of consumption expenditure it is common to adopt short recall periods (e.g., seven days) for goods that are purchased frequently (such as food), and longer recall periods (e.g., one year) for items that are purchased infrequently (such as durable goods).

Another important caveat regarding the design of this section of the module is that the short and standard modules do not factor in the possibility that animals reared by a household may not be owned by the same household. This simplification will be problematic in countries where it is common practice for households to confer animals to other households for a variety of reasons. Users in countries where this is a frequent occurrence should look at the extended version of the questionnaire for one approach to differentiating among livestock owners and keepers.

Products, services, and income from livestock

One key objective of most multi-topic surveys is measuring full household income by collecting detailed data on all income sources, so as to be able to capture the multiplicity of household activities in its entirety (Wye City Group, 2011). One peculiarity of livestock among the different activities rural households engage in is that it provides them not only with outputs in the form of livestock products, but also with a variety of services that most often are not marketed. Often, these services can be more important for the households than the products the households consume or sell on the market. The standard livestock module attempts to capture the diversity of these benefits by including detailed questions on both livestock food products (meat, milk, and eggs), non-food products (dung, which is used for fertilizing plots, but also as construction material and fuel), and services such as transport and draft power.

One difficulty in collecting livestock production data is that products such as milk are produced continuously over a survey year, with seasonal patterns—as opposed to those crop products that are harvested once or twice a year, where the quantity of harvest is a salient event that is not difficult to recall, particularly if the survey visit is well timed to occur not too long after harvest. Recalling the offtake of milk from events that have taken place over the course of an entire year, with fluctuations linked to animal reproduction and lactation cycles, places an extremely demanding cognitive burden on the respondent. Further, milk offtake is also a decision variable for the farmer, who can decide to take off less than an animal's full production potential of milk if, for instance, market conditions are not favorable or if there is a need to leave milk for offspring to secure their healthy growth. Labor-intensive survey instruments have been devised to capture milk offtake in specialized livestock surveys (e.g., Lesnoff et al., 2014), but they are too burdensome to be integrated into

multi-topic, large-scale national surveys. The instrument proposed in this template is based on standard recall techniques, but has been shown to work reasonably well by a validation experiment undertaken in Niger (Zezza et al., 2015).

Meat production data is somewhat easier to collect, although it also poses its challenges. As for livestock numbers, the approach taken here is that of using a longer recall period for less frequent events (12 months) such as for the slaughtering of larger animals, and a shorter recall period (3 months) for the slaughtering of small animals. A similar approach is also proposed for eggs, given that the clutching period is usually a few weeks and that seasonality is limited. Since at the analysis stage the goal is usually to compare aggregate annual values for the variables of interest, questions need to be built into the survey instrument that will allow for the reconciliation of information that has been collected with different reference periods to the same annual basis.

Regarding meat production from large animals, it is worth emphasizing that in low-input extensive livestock systems, the occurrence of slaughtering for own consumption of bovines is a fairly rare event, which usually occurs when the animal can no longer provide other services (e.g., milk or draft power), and that animals for slaughter are more often sold alive. For all products, it is important to record the total offtake quantity as well as the quantity devoted to own consumption and the quantity sold. These details are necessary in order to analyze the contribution of livestock to the nutritional status of household members (livestock products being exceptionally dense in nutrients, Randolph et al., 2007), as well as the role of livestock products as a steady source of cash. In agrarian economies where harvested crops are often sold in bulk shortly after harvest, households cash income would be concentrated in one or two periods of the year. Thus, the possibility to recurrently sell products such as milk, eggs, and small animals (namely poultry) represents one of few possibilities for households to secure a steady cash stream throughout the year.

Dung is the one product for which it is likely to be even more challenging to collect data than milk offtake. Dung is used as manure, fuel for lighting and cooking, feed, construction material, and also for sale. Quantifying the amount of dung produced by the animals on the fields is clearly not something that can be asked of respondents, and the module therefore attempts to collect only some basic information on the main uses of the dung, attempting to quantify only revenues from dung in the case that any was sold. This information, though limited, can be used to qualitatively assess the role of dung uses for the household, but can also be employed in quantitative analysis of crop livestock interactions, for instance by including access to the livestock dung used as manure as an explanatory variable in analyses of the determinants of crop yields.

A similar approach is proposed in the module for the use of animals for transport and draft power (e.g., for ploughing). It is extremely challenging to quantify the exact contribution of large animals to the household in terms of transport and draft power services, but that is no reason to discount collecting data on these services completely. The module proposes a tractable middle ground by collecting information on whether and how the household used different types of animals for such services, and attempts to quantify whether these services were sold to other users. The monetary component can be incorporated into the calculation of cash incomes and could be used to inform attempts (which will require heroic assumptions) to impute values for the portions of these services that are not channeled via any market. This information can also be used in qualitative evaluations of the contribution of livestock to livelihoods, as well as in analyses aimed at understanding how livestock can add to the potential for the household to generate revenues in other sectors, for instance by contributing to higher crop yields, by alleviating labor constraints, or by allowing them easier access to markets.

Since slaughtering is rare in the small-scale household livestock holdings that these questionnaires target, so too is the production of hides and skins at the household level. Therefore, only a yes/no question is recommended to understand the extent to which livestock keepers collect hides and skins after slaughtering. In instances where the production of hides and skins is expected to be common and to make up a substantial part of households' earnings, additional questions can of course be added to the questionnaire.

Livestock inputs and husbandry practices

A major determinant of livestock productivity in the household sector is the availability of quality inputs, in terms of feed, water, animal health and extension services, and housing. Understanding the farmers' knowledge of and ability to use appropriate breeding practices, and to apply the required level of labor inputs is also important in appreciating the constraints farmers face in successfully engaging in livestock

production. Not least, animal health service provision and dealing with animal health issues are probably the tasks that absorb most of the energy and resources of national livestock departments or ministries in most countries. Data on all these domains are therefore essential for any analysis of livestock systems and the key constraints to the growth of livestock in the household sector, as well as for understanding how effectively service provision is reaching different household types, where more investments might be needed, and what might be done to improve the targeting, quality, and outreach of livestock service delivery.

The livestock module includes a short set of questions on the adoption of mating and breeding practices (distinguishing among the main livestock types), and collects information on whether any monetary outlays were associated with the adoption of those practices. These can be considered as a cost component in the calculation of income from livestock. The module also collects information on the type of housing different animal types are kept in—which is not only an indication of the animals' exposure to weather events, thefts, and predations, but also of the likelihood that household members may be exposed to illnesses or viruses as a result of sharing living space with the livestock.

Household-sector information about animal feed— including natural and planted pastures, fodder crops, crop by-products and residues, roots and tubers, and balanced concentrates—is often scarce or anecdotal, even though feeding scarcity or low-quality feeding products are among the non-genetic factors with greatest bearing on productivity, often representing the highest share of costs on the balance sheet.

The livestock module addresses the issue by soliciting information on feeding and grazing practices and the purchase of any feed, and, if applicable, the cost of feed purchases. The respondent is asked about the main feeding practice in the previous 12 months, with options being 1) grazing/scavenging: letting cattle graze on privately or publicly owned pastures or letting chicken scavenge-, 2) mainly grazing/scavenging with some feeding, 3) mainly feeding with some grazing/scavenging, and 4) zero grazing/ zero scavenging and only feeding. The objective is to characterize feeding practices by household and animal types, while obtaining data on costs that can be used in the calculation of income, and on the prevalence of the uses of purchased versus own-produced or free feed resources. In many countries (and particularly in drought prone areas), seasonal variations strongly influence feed availability and quality, hampering animal productivity. In order to capture seasonal differences, the livestock module separates many feeding (and watering) questions into two seasons. The increased possibility of combining georeferenced household surveys with other spatial information (from remote sensing, modelling, etc.) opens up opportunities for enriching household-level analysis with spatial data, and spatial analysis with household-level behavioral data to better understand the complex relationships between livestock management and natural resources.

Similar considerations can be drawn for water. Scarce access to water sources is another important constraint to livestock productivity in many developing countries. The module collects data to characterize the main source of watering (such as borehole, dam, well, river, spring, stream, constructed water points, rainwater harvesting, or other) for different kinds of livestock, by animal type and main season. In addition, data are collected about how frequently animals are watered and about the main person in the household responsible for watering the animal. As with the other inputs, information is then solicited on any costs associated with the watering of livestock, which can be subtracted from the production value for the calculation of income, net of costs.

Usually, data on animal health and diseases are regularly collected by the ministries responsible for livestock, given the potential costs (and not only in economic terms) of disease outbreaks. These data are usually collected by field government staff and not through survey questionnaires.

The information base on the incidence and distribution of animal health issues is however lacking in many countries. The potential of household surveys to contribute to building such an information base is limited by both sample-size issues and limitations in respondents' knowledge when it comes to recognizing specific diseases or characterizing the exact type of treatment or vaccine administered to livestock. Moreover, the prevalence of specific diseases may be too small for the number of observations in a national sample survey to be useful for detailed analysis, and small livestock keepers may not be able to correctly identify the diseases affecting their livestock or the vaccines and other treatments administered by animal health professionals. The advantage of household survey data is that it provides the type of socio-economic information that is generally lacking in administrative sources, thus allowing for a broader characterization of the type of households and type of animals most likely to be affected by the diseases with the highest prevalence, and how well

public and private health services are (or are not) serving households in different socioeconomic strata or in different regions. The animal health section of the livestock modules includes questions on vaccinations by main animal types, treatments against internal and external parasites, curative treatments, and the monetary outlays (if any) associated with these interventions.

Labor and livestock activities

Measuring labor and collecting data about labor inputs in agricultural activities has always been a challenging task and the livestock sector is no exception. In particular, the measurement of labor spent for livestock rearing presents several rather unique challenges. Firstly, many activities (with the exception of milking), are done at once and for the entire herd, which often includes different species; watering and feeding are often joint activities, with small and large livestock taken to pastures where water sources are available. It therefore becomes very difficult to assess how much of the labor input should be attributed to each animal type or to each task, and hence to measure the labor intensity of specific tasks, or labor intensity or productivity by species. That makes it challenging to design modules that can accurately measure labor inputs, particularly when there is heterogeneity in the way different households manage these tasks. One way of overcoming this issue is to include questions that ask whether small ruminants and large ruminants or other animals have been fed and watered jointly, and then all the questions refer to at least each livestock type, so it is possible to disaggregate labor inputs at least among these categories. Another critical issue is the possibility of multitasking when taking care of animals. It is possible that the animal is taken out to pasture while the household member is performing some other task (e.g., working on the farm, or in an adjacent plot), which also makes it close to impossible to attribute specific portions of that work time to crop or livestock production.

Given the complications just discussed, the recommendation in the livestock module is to relinquish the idea of collecting information on specific labor inputs in these types of surveys, and focus rather on collecting much coarser information on who in the household is mostly responsible for completing key tasks related to livestock (by main livestock types) and on whether the household hired labor for raising the animals. While this information is not enough to allow a precise quantification of labor inputs, it provides a good basis for some analysis of the division of labor across gender (and

age) lines when it comes to livestock rearing, and for quantification of the total cost of hired labor inputs. The India survey referred to in Anagol et al., (2013) attempts to measure labor inputs more precisely. It asks about the number of hours spent taking care of livestock per day in households that own and keep animals. The authors then estimate the cost per hour of this labor, and use the results to observe that children and adults (both men and women) in the household are generally equally responsible for the care of the animal.

Livestock and gender

A vast and growing literature documents gender inequalities in nearly all aspects of livelihoods, from access to education to asset acquisition, wage differentials, and beyond. The livestock sector is no exception, in that women are often disadvantaged relative to men in terms of herd size, managerial roles, scale of production, and access to industrial value chains (FAO, 2011). At the same time, given the role of livestock as an insurance mechanism, a store of wealth, and a potentially sustainable income-generating activity (FAO, 2009), the livestock sector can serve as an important source of livelihoods, and a potential pathway out of poverty for rural women (IFAD, 2011).

This growing literature is a sign of how gender issues in agriculture have attracted an unprecedented wave of attention in recent years. The production of gender-disaggregated data on agricultural production, however, has lagged behind. This lack of progress is particularly notable with regard to livestock issues. The dearth of gender-disaggregated data has been acknowledged by and has affected the analysis presented in FAO and World Bank flagship reports on gender in recent years (FAO, 2011; World Bank, 2011). Traditionally, the only feasible gender analysis of agricultural issues using national multi-topic surveys involved comparing male- and female-headed households. Such an analysis clearly misses critical aspects of gender differentials, such as the different demographics of male- and female-headed households and the intra-household allocation of resources. Only recently have multi-topic surveys started including more detail on individual-level ownership and management of livestock (alongside other agricultural activities).

Incorporating that into survey design will increasingly allow for the assessment of gender differences in ownership of livestock, and the accumulation of the kind of systematic evidence that is now lacking on patterns of livestock ownership across gender lines, the differences in herd structure

between male and female owners, and possible differential levels of access to both input and output markets. It is of paramount importance to distinguish ownership of livestock, livestock management, and the control of resources/earnings from livestock production activities. Ownership or greater engagement in livestock management does not necessarily imply control of earnings from livestock, but control of earnings can also occur in the absence of full ownership

The livestock module targets information on gender and livestock in two major ways. In the ownership section, questions are asked separately on who owns and who manages livestock. Ranking ownership roles (such as primary vs. secondary owner) is not recommended. At the analysis stage, it will be important to make decisions compatible with the goals of the analysis on responsibility/management of livestock and how to categorize ownership (e.g., exclusive male ownership, exclusive female ownership, or joint ownership; see de la O Campos et al., 2015 for a related discussion). Additional questions on key individual roles, which can be used to inform gender analysis, are included in the sections on the main tasks related to animal husbandry (such as watering, feeding, etc.—see the labor section above). Additional individual-level questions can be asked with respect to the sale or disposition of livestock and their products, so as to obtain information on who makes key decisions on sales, for example, and who retains control of the revenues from those sales.[5]

Finally, it should be noted that gender roles pose challenges to the interview process itself. In current LSMS practice, the recommendation is that questions from each survey module should be directed to the 'most informed person in the household' regarding that particular item or activity, and that a space be provided in the questionnaire and data-entry program to record that information. In the case of some livestock activities, however, different individuals may be in charge of performing different tasks related to the same product. For instance, in some cultures, men milk the animals but then pass on the milk to the women for processing, storage, and sale. However, directing different set of questions in the same section to different individuals may be overly cumbersome in terms of survey logistics and may be too demanding in terms of respondents' time. Survey designers should therefore be aware of these limitations and attempt to manage them as best as possible without jeopardizing the

respondent's willingness to collaborate in an interview that is much broader in scope.

Food consumption, food security, and nutrition

Livestock contribute 26 percent of total protein and 13 percent of total calories consumed in the human diet, mostly via milk, meat, and eggs (GASL, 2014). According to OECD-FAO data, global meat consumption is anticipated to grow from 311 to 353 million tons between 2015 and 2024, with 82 percent of this increase originating in low-and middle-income countries. Global milk consumption, estimated at 621 million tons in 2011 (FAOSTAT, 2016), is expected to grow even faster, with per-capita consumption increasing by about 1.8 percent per annum between 2015 and 2024 in low- and middle-income countries, and by 0.8 per annum in the developed world (OECD-FAO, 2015).

Increased consumption of animal source foods (ASFs) can have numerous nutritional benefits for both poor and non-poor households. Compared to foods from non-animal sources, ASFs are nutritionally dense sources of energy, protein, and other essential micronutrients. As such, ASFs can make it possible for children and for pregnant and breast-feeding women to obtain calories as well as high-quality protein, micronutrients, and overall better nutrition (Sigman et al., 1991; Grosse, 1998b). ASFs are a major source of iron, zinc, calcium, riboflavin, vitamin A, vitamin B-12, and retinol; increasing the intake of ASFs and the micronutrients they contain may have numerous positive benefits—including increased linear growth and improved educational attainment and health status—leading to long-term improvements in income and productivity (Allen, 2003; Black, 2003; Iannotti, 2012; Dror & Allen, 2011; Sadler & Catley, 2009).

Ownership of livestock can give households more opportunities to increase the consumption of ASFs if livestock ownership translates into cheaper or more reliable access to ASF supplies. This may be likely when markets are poorly developed, especially for highly perishable products such as milk and meat, which require investments in refrigeration, processing, and other equipment that may not be economically justified in the presence of sparse effective demands for such goods (Azzarri et al., 2015).

On the other hand, ownership of livestock can adversely affect the well-being of children through untimely substitution of breast milk with animal milk (Grosse, 1998b), and of all household members through the spread of zoonotic and food-borne diseases (FAO, 2013a; Pickering et al., 1986).

5 See, however, Kilic & Moylan (2016) for an example of known asymmetries in the responses to these questions depending on to whom the question is asked.

For example, Griffin & Abrams (2001) find that consumption of fresh, unheated cow milk by infants younger than 12 months is associated with fecal blood loss and lower iron status. Livestock ownership in general and dairy production in particular can also have a negative impact on children by increasing the labor demand on childcare providers, or the incidence of zoonoses (Iannotti, 2012). When household resources are under stress, livestock may also start competing with humans for the allocation of foodstuffs, with implications on the availability of food for household consumption. Furthermore, the excessive consumption of livestock products is associated with increased risk of overweight and obesity, heart disease, and other non-communicable diseases (WHO & FAO, 2003), although the relationship between ASFs, weight gain, and obesity is a complex one (see Weaver et al., 2013 for a detailed discussion of the evidence related to dairy consumption).

LSMS-type surveys offer a unique opportunity to investigate the complex relationship between livestock ownership and nutrition because they stand out from other surveys in integrating information on multiple elements of the equation: production, income, food consumption, and, often, nutritional-outcome indicators. At the same time, the detailed food-consumption module, combined with information on own production, allows for the monitoring and understanding of patterns and trends in the consumption of ASFs in a given country, and how they change across households, with geography, and (when surveys are repeated) over time. Much of the information relevant to these analyses is included not in the livestock module, but in the food-consumption module (and when present, the anthropometric measurement module) of the survey, and thus will not be discussed in any detail here. Suffice to note that an examination of food consumption and nutrition-related information, together with information on livestock ownership and welfare, allows for an understanding of what strata of the population can derive nutritional benefits from what kind of animals under what conditions (see for example Azzarri et al., 2015; Hoddinott et al., 2015; Slavchevska, 2015).

6. The Standard Version of the Livestock Module

The purpose of the standard livestock module of the household survey is to provide a comprehensive portrait of the livestock economy at the household level, with specific insights into factors affecting household income. This module collects information on large ruminants, small ruminants, camelids, pigs, poultry, equines, and any other livestock animals that have been or are currently owned and/or kept by the household. It seeks to tease out information regarding the dynamics of livestock production over the varying reference periods (see below for details), and on livestock-related inputs and outputs, both in quantity and in local currency value terms. This module consists of nine different sections, including: A) Livestock Ownership, B1) Changes in Stock over the Past 12 Months: Animals, B2) Changes in Stock over the Past 3 Months: Poultry, C) Breeding, Housing, Water, Feed, and Hired Labor, D) Animal Health, E) Milk Production (Off-Take), F) Egg Production, G) Animal Power, and H) Dung. All the questions proposed for inclusion in the short version of the module are identified with an asterisk (*).

Section A—Livestock ownership

This section is designed to gather general information on overall livestock keeping and ownership among the interviewed population: the number and structure of the herd/livestock kept by households, who owns and mainly keeps the livestock, and the main reasons why households keep animals.

Note that the reference period for this section is the time of interview (representing a snapshot of the current ownership picture).

Q1*-Q2*. The first question asks whether the household has kept any of the livestock on the list over the survey reference period. The list can be reduced, expanded, and adjusted depending on the context and purpose of the survey implemented. This serves as a screening question, since if the household has not owned or kept any animals of a given kind, then no additional questions will be asked on that animal. The flow of the interview is supposed to be organized line-by-line for each section of the module. The information collected in Q1 can be copied on a 'Livestock flap' (see below) to facilitate the rest of the interview. The main purpose of these questions is to find out if households own or keep any type of livestock. Households are asked to report the number of livestock they keep (regardless of ownership) for each animal type, which allows for a characterization of the size and composition of the herd/flock managed by the household.

Q3. This question collects information on how many of the livestock kept are exotic or crossbred animals. When exotic or crossbred animals are popular, the list of animals can be further disaggregated to capture the rest of the module's information separately for local and exotic breeds.

Q4-Q14. These questions aim to capture more information about livestock ownership and management. It can be the case that households manage livestock on behalf of others, or give the livestock they own to others to manage. When considering livestock as an asset, it is important to assess the number of livestock actually owned by a household. When considering management aspects, a household will only be able to answer questions concerning the livestock that are actually in its possession, which is why the following sections will only focus on the livestock managed (kept) by the household. The paired questions 8-9 and 13-14 follow the guidance of Kilic and Moylan (2016), who show how this is a more effective way of eliciting responses on individual ownership of assets.

Q4. This question collects information on which members of the household are responsible for keeping or managing animals in the household. This questions aims to capture information on the different roles members in the household play in the management of different animals.

Q5-Q7. These questions collect information on household ownership as well as management. Households are asked if they own any of the livestock that they keep. These questions also collect information on the number and type (presence of exotic or crossbreeds) of animals kept and owned by the household.

Q8-Q9. These questions collect information about household members who own the livestock they keep, as well as information on which household members actually own the animals they keep.

Q10-Q14. These questions collect information about household members who own the livestock they do not keep, as well as information on how many animals the household currently owns and whether any of these animals are cross or exotic breeds.

Q15*. This question collects subjective information on the two main reasons why households decide to own or keep each of the livestock types. This question provides eight possible options: 1 = sale of live animals; 2 = sale of livestock products; 3 = food for the family; 4 = savings and insurance; 5 = social status; 6 = crop agriculture (manure, draught power); 7 = transport; 8 = other (specify), but different codes may be relevant in different settings. Households keep livestock for many purposes that are difficult to capture quantitatively in an objective manner. This question is useful in obtaining a subjective perception of such motives.

Livestock flap

The 'flap' is a foldable piece of paper which, when unfolded (i.e., folded out), allows the enumerator to have recurrent information readily available regardless of the page of the questionnaire that is being filled. All the questions in Sections B–H need only be filled if the household owns a certain type of livestock. Copying the information from Question 1 on the flap allows the enumerator to always be able to check which livestock the household reported owning. The flap requires a little more effort in printing and binding questionnaires since the flap page will have to be folded in, but makes the interview process much easier for both the enumerator and the respondent since the enumerator does not need to go back and forth across questionnaire pages to check

the information in Question 1. The flap is normally used for duplicating the household members' list from the roster in most LSMS surveys. A livestock flap was used in the Tanzania NPS 2014/15 and was found to be very useful, leading to a smoother implementation of the survey operations. In surveys implemented using Computer Assisted Personal Interviews (CAPI) technology, this function is programmed in the CAPI software and the enumerator is automatically prompted with the relevant lines of questionnaire to be filled.

Section B—Changes in stock

This section is designed to assess changes in the size and composition of the livestock herd/flock kept by the household over the survey reference period. The focus is on livestock kept rather than owned since respondents may not be fully informed about livestock they own but do not manage. As discussed, longer recall periods may work better for less frequent events. Livestock transactions as well as births and deaths are more frequent for poultry, somewhat less frequent for small ruminants, and less frequent for large animals. The proposed questionnaire foresees two main recall periods: 3 months for poultry and 12 months for all other livestock types. Three recall periods can also be used, by adding a 6-month recall period for small ruminants. A blanket 12-month recall period is often used but, based on the experience of the LSMS team in Uganda and Tanzania, is not recommended.

Section B1—Changes in stock over the past 12 months: animals

Q16-Q33. The purpose of the first question (Q16*) is to obtain information on the number of livestock the household kept at the beginning of the reference period. This information is useful for evaluating any intervening changes in livestock holdings: births (Q17), purchases (Q18-20*), gifts made/received (Q21-24), deaths/losses (Q25-26), sales of live animals (Q27-29*), and slaughtering of animals (Q30-33*). Information is also provided on the financial inlays and outlays associated with all sales and purchases, which is a necessary input for the computation of livestock income and the valuation of livestock assets. Unit prices are not directly asked, but can be approximated based on the value of the total sales/purchases and the number of animals bought or sold.

The questions on slaughtering assess whether the household slaughtered any livestock, how many animals were slaughtered, and whether the household sold the slaughtered livestock type or meat. 'Meat per slaughtered animal' allows

for the calculation of total meat production when multiplied by the number of animals slaughtered over 12 months. The module therefore does not include a separate set of questions on meat production and sales. In the LSMS experience, households tend to sell live animals, and only rarely slaughter animals for sale. In settings where this is not the case, users may want to develop a separate set of questions on meat production and sales.

Section B2—Changes in stock over the past three months: poultry

Q34-Q51. These questions collect the same information as for Section B1, but for poultry, with a particular focus on backyard poultry. The main difference between the two sections is the length of the recall period. Since poultry are short-cycle animals, their births, sale, purchase, and slaughtering are more frequent, and for this reason a shorter recall period is expected to perform better.

Based on similar considerations, users can consider splitting Section B1 in two parts, introducing an additional six-month recall period for small ruminants. One consideration in doing so is whether seasonality is important for small ruminants. If that is the case, the timing of the fielding of the questionnaire might result in biased estimates. If the questionnaire is fielded at a time when the preceding six months were not particularly productive, then annual productivity of small ruminants would be underestimated (the contrary being true if the preceding six months included those where most of the annual production was concentrated). Poultry production is generally less prone to seasonal patterns, so the issue is less of a concern for Section B2.

Section C—Breeding, housing, water, feed, and hired labor

This part of the module allows for a broader perspective of households' major husbandry practices. For the short module, priority is given to questions on expenditures, since those are necessary to compute income net of costs. The questions on husbandry practices help obtain a better picture of what the prevailing practices and their distribution may be, but they are not necessary if the aim is simply to generate a measure of income from livestock.

Q52-Q67*. These questions are designed to portray the breeding strategies and practices used by the household, assessing the use of controlled breeding practices and any related costs of breeding. The first two questions (Q52-53) solicit information on whether the household practiced any control or other breeding strategy for each of the livestock types, and if so, what the practices were. Evaluating more than one breeding strategy may be useful in some contexts. The extended version of this module may ask households to specify two or more of the breeding strategies implemented (by allowing space for two answers and codes in Q53). Q54* and Q55* ask whether the household incurred any costs in local currency.

Q56. This question aims to obtain information on the main housing system for each livestock type used by the household. This question provides eight possible options: 1 = none; 2 = confined in sheds; 3 = confined in paddocks; 4 = confined in fences; 5 = cage; 6 = basket; 7 = inside the house (e.g., kitchen); 8 = other (specify). Note that not all codes apply to all animals.

Experiences from previous surveys (such as the Tanzanian 2012/13 National Panel Surveys) highlighted the need to incorporate Option 7 since the data revealed that 93 percent of households that had previously indicated "other" meant they kept some livestock (such as poultry) inside the house. The standard version of this module thus incorporates this option in order to more precisely capture livestock housing. The list of codes can be modified to reflect different practices in different settings.

Q57-Q61. These questions are designed to assess the watering practices undertaken by the household in relation to livestock husbandry. Q57-Q59 ask how frequently livestock are watered and by whom, as well as the main sources of water. Q60*-Q61* ask whether and how much the household paid for the water in local currency. Experience from surveys such as the Tanzanian 2012/13 National Panel Surveys highlighted the importance of breaking several of these questions down by season, to capture the year-round variability of watering practices. Seasons are indicated here generically as first and second seasons, but the terminology and design will have to be tailored to the specific setting where the survey is to be implemented (including by allowing for more than two seasons as relevant). Analysis of the Tanzanian NPS data shows that seasonality is well captured by such questions: many households pay for feeding and watering animals during the dry season (between June and September), with the frequency of paying for water decreasing from October/November, when the short rainy season starts. Obtaining information on how much households paid for water

enables the evaluation of part of input costs incurred by the household.

Q62-Q65. These questions aim to obtain information on feeding practices undertaken by the household for each livestock type. This part of the module assesses the main feeding practices for livestock (Q63), who mainly feeds the livestock (Q62), and whether and how much the household paid for the feed in local currency (Q64*-Q65*). As for watering, Q63-Q64 are also split into two to capture seasonal patterns on watering practices during the 12-month reference period (Q61*). Dairy animals require more energy during milking periods compared to non-milking periods (Santosh et al., 2013). This would suggest separating the feeding periods not only by season, but also by milking periods. When this distinction is considered important. it should be incorporated in the module.

Q66-Q67. These questions aim to capture synthetic information on whether any paid labor was hired by the household to help with keeping livestock. The questions are not broken down by animals or groups of animals since households often keep mixed herds (e.g., small and large ruminants together), which makes it very difficult to attribute labor to one or another type of animal; there is a risk of double counting labor inputs or incorrectly attributing that labor to only one group of animals. An alternative option is to keep the disaggregation by livestock types, but to devise specific codes and instructions to the enumerators to be used when the labor inputs are to be attributed to multiple livestock types. No attempt is made here to also break down the labor by tasks performed, but in contexts where labor is mostly hired for specific tasks (e.g., grazing) these questions can be moved and amended to be tied to the parts of the questionnaire where information on those tasks is collected. The extended module has a few more questions on labor, including on unpaid household labor

Section D—Animal health

The control of livestock diseases is one of the main concerns of both livestock producers and livestock policy makers. Livestock keepers and other government and private stakeholders play different roles in promoting animal health and reducing the negative effects of diseases, but all can benefit from an improved understanding of which animals, belonging to which type of producers, are affected by what types of diseases. This section is designed to assess the occurrence of main animal health issues and practices. The section draws on analyses of what worked and what did not in previous surveys such as the Tanzanian 2012/13 and the Uganda 2011/12 National Panel Surveys. Disease and vaccination codes, similar to codes in other parts of the questionnaire templates, are included as examples, but should always be tailored to be relevant to the context were the survey is going to be fielded. The module starts with a simple assessment of the prevalence of animal diseases as reported by the respondents. After that, questions are asked on preventive health measures and curative treatments (and related costs).

Q68*-Q69*. These questions ask about the numbers of animals affected by livestock diseases. A sample list of possible disease codes is provided, but it will have to be modified to reflect local contexts. In creating a list of codes, it is important to be guided by the principles that 1) the disease names should be familiar to the respondents, and 2) it is not worth including diseases with very low incidence. Even if the diseases are known to respondents, if the incidence is low, the survey will likely capture too few observations to be used in a meaningful way at the analysis stage.

Q70*-Q78*. These questions aim to obtain information on preventive measures that households have taken to preserve the health of their livestock. This information is useful for both public and private livestock service providers. Households are asked whether they vaccinated any of their livestock (Q70*) and against which diseases (Q71). Since vaccines may last for more or less than 12 months, users may decide to formulate the questions in a slightly different way than what is proposed here depending on the information that is of interest. The reason for having two separate sets of codes for vaccines and diseases is that vaccines are not available for all diseases, and having a specific set of codes prevents enumerators or respondents from selecting a disease code that does not apply to vaccinations. It will also be important to make sure that local disease names are appropriately identified during questionnaire preparation. In the proposed template, the focus is on vaccines administered during the survey period, so that these can also be linked to possible expenditures. Respondents are then asked whether they used preventive measures against internal parasites (e.g., worms, Q72) and external ones (e.g., ticks, Q73) and how much they spent on all these measures combined (Q74*). Finally, Q75* and Q76* solicit information on the curative measures that households have taken to preserve the health of their livestock, and the occurrence of any related expenditures.

Section E—Milk production (off-take)

This section is designed to assess milk off-take[6] and use, income from milk production, and some basic parameters to compute simple measures of productivity. This section only applies to livestock types from which milk and milk products are typically obtained: large ruminants, small ruminants, and camelids.

Q77*-Q80*. These questions aim to obtain basic information on household milking practices, mostly for the computation of total annual milk off-take. Households are asked whether they milked any animals, how many animals for each livestock type were milked, for how many months, and how much milk was produced on average during this period.[7] These questions allow for the computation of the amount of milk produced by each household in the reference period as:

Milk production (off-take) in the past 12 months = Average quantity of milk per day (Q80) * Number of months livestock were milked(Q78) * 30

Q81. This question collects information on the division of labor among household members with respect to the milking process. Different cultural practices around the world may affect the division of tasks (such as milking, preparing products, or selling them) among household members. There is no one-size-fits-all solution to that in a survey, but practitioners should be aware of the challenge. This question explicitly asks which household member mainly milked the animals.

Q82-Q86*. These questions focus on the use of the milk obtained by the household, first prompting for a subjective assessment (Q82) by asking quantitative questions aimed at capturing own-consumption (Q83*) and sales (Q84*, Q85, and Q86*) in terms of quantities as well as sale and earnings in local currencies. Depending on the importance of processed milk in specific settings, questions in this section can be rephrased, or additional questions included, in order to capture transformed milk and other by-products (butter, ghee, curd, cheese) since most of the sales might be in processed dairy products as opposed to fresh milk.

Section F—Egg production

This section is designed to assess egg production at the household level and for each poultry type. Drawing again on experiences such as the Tanzania 2012/13 and the Uganda 2011/12 National Panel Surveys where data on egg production were found to be unreliable even after outliers were dealt with, it was decided to design the module around clutching periods of hens. This approach was used by the Tanzania Ministry responsible for livestock to measure egg production, and the collected data were found to be of good quality. Information on the length of the clutching period is a pre-condition for calculating quarterly and annual estimates of egg production.

Questions on production are asked in the first part of the section: number of clutching periods by animal type (Q88*), number of eggs per clutching period on average (Q89*), and number of clutching animals (Q90*). Given the frequency of egg production, and the similarly to the module on poultry ownership, the recall period in this section is 3 months for questions Q89* to Q94*, even though the opening questions are asked on a 12-month basis to capture information on whether households have produced eggs over the survey period, and even if for some reason households have not produced eggs in the last 3 months. Based on these questions, the total number of eggs produced by the household in the survey period can be computed as follows:

Total number of eggs = Laid eggs per clutching period per bird in last clutching per clutching period   period(Q89) * Number of birds that had their clutching period in past 3 months (Q90)

Second, calculate:

Number of eggs over 12 months = Total number of eggs per clutching period * Number of clutching periods in past12 months (Q88)

The second part of the section asks about egg sales (Q91*-Q92*) and earnings (Q94*), and who in the household is in charge of egg sales (Q93).

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6 The term milk off-take refers to the amount of milk the farmer takes from the lactating animal for human consumption. Milk production refers to the total milk that is produced by an animal, which includes whatever is left to give to offspring. The interest in this module is on off-take.

7 Some practitioners prefer to collect information on milk from all the animals of a certain kind at once (what we suggest here), while others prefer to identify a specific animal in the herd, or ask about average production per animal. In such cases, the average milk off-take for the herd can be calculated by multiplying the milk offtake per animal per day by the number of animals milked on average (Q79).

Section G—Animal power

This section is designed to assess whether the household made use of any animals for draught power, for what uses, and whether the household received any cash earnings by selling animal power services. Q96 provides a short list of possible codes that should be modified depending on the setting where the survey is implemented, and foresees the possibility that this question can be asked by season when this might be relevant. Q97 and Q98 ask about the provision of services to other households and whether payments were received for those services. In the standard module, all the services are lumped into a few questions, but when there is a specific interest in these questions, it can be unpacked so that questions are asked separately for different services (e.g., transport, ploughing). However, a more disaggregated approach only makes sense when this occurrence is prevalent enough to yield a sufficient number of observations for the analysis. When that is not the case, the additional burden on enumerators and respondents is not justified.

Section H—Dung

The supply of agricultural manure is another important function of livestock. Moreover, dried dung cakes are widely used as a source of fuel in low- and middle-income countries, particularly where firewood is in short supply. Households in several countries also use livestock dung as a building material, as fertilizer for fish ponds, and as protection against some insects (FAO, 2007). This section is designed to assess whether the household has made use of any animal dung, and if so, for what purpose. Accurately quantifying dung production is very difficult since much of what is used as manure is often simply left on the field by the animals while grazing. The module therefore is limited to very basic information on whether any dung was produced (Q99), for what main uses (Q100), whether any was sold (Q101), and if so, in exchange for what earnings (Q102).

7. Conclusions

In recent years with the growing recognition of the role of agriculture for livelihoods, poverty reduction, and economic growth, the agricultural section of LSMS surveys has been expanding its coverage, including its livestock content. Livestock keeping serves many purposes. Livestock generate nutrient-dense food, provide a source of cash income, and are a store of wealth that serves as a safety net in times of crisis. In addition, they provide draught power and hauling services, manure, fuel, and building material. Plus, they transform crop residues and food waste into valuable protein and contribute to social capital (FAO, 2009). In recent years, there has been a renewed interest in research on the relationship between agriculture and nutrition, and several studies have uncovered associations between holding livestock and better food security and nutrition—at least where market failures are pervasive (Hoddinott et al., 2015; Azzarri et al., 2015). Data from 12 low- and middle-income countries in Africa, Asia, and Latin America show that between 46 to 85 percent of rural households—many poor and food insecure—keep farm animals, with a country average of about 60 percent (FAO, 2009). For many households, livestock provide nutrient-dense food, increased opportunities for value addition and income generation, a steady cash stream, fertilizer for crops, hauling and ploughing power, and a way to save and accumulate assets that can be easily turned into cash when the need arises, and are often used as a collateral for loans (Otte et al., 2012).

Despite the importance of livestock for so many aspects of household livelihoods, the information base available to public and private decision makers to chart strategies for livestock-sector development and to design program and investment plans is very limited. The state of agricultural statistics is poor in many low- and middle-income countries, and that is particularly the case for the livestock sector.

Multi-topic household surveys can offer an important platform to address this lack of information. These surveys are implemented in many countries to monitor and understand poverty, and can be a cost-effective vehicle for collecting data on agriculture and livelihoods, as demonstrated by the experience of the LSMS-ISA program in Africa.

The objective of this Guidebook is to provide a tool for practitioners tasked with collecting high-quality data on livestock and livelihoods in the context of the national statistical system and through the implementation of multi-topic household surveys. The Guidebook offers a template for module design that users are advised to tailor to their specific needs. Recognizing that different users will have different priorities in terms of what they need to measure, monitor, and analyze—and that they face different constraints in terms of implementation—the module template comes in three forms.

The first is a short version of around 30 questions that focuses on the basic characteristics of the herd, computing a measure of livestock income and some limited information on livestock production and constraints. The second is a standard version of about 100 questions that has more detail on all of the above, and collects additional information on animal husbandry practices and livestock services and on the individual roles of household members with respect to some key aspects of livestock management. The third is an extended version (available as an online annex on the LSMS website, www.worldbank.org/lsms) of around 170 questions that collects more detailed information on all of the above. An enumerator manual is also available online.

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ANNEX: LIVESTOCK MODULE TEMPLATE

STANDARD VERSION	
LIVESTOCK MODULE - CONTENTS	
SECTION A	Livestock Ownership
SECTION B1	Changes in Stock over the Past 12 Months: Large and Medium-Size Animals
SECTION B2	Changes in Stock over the Past 3 Months: Poultry
SECTION C	Breeding, Housing, Water, Feeding, and Hired Labor
SECTION D	Animal Health
SECTION E	Milk Production (Off-take)
SECTION F	Egg Production
SECTION G	Animal Power
SECTION H	Dung
Throughout the module, the questions forming the short module are highlighted in green.	

Note: An editable version of the template is available on the LSMS website, www.worldbank.org/lsms.

CONFIDENTIAL

COUNTRY NAME

National Statistical Office

NATIONAL LIVING STANDARDS/AGRICULTURAL SURVEY - YEAR 20xx

This information is collected under the [NATIONAL STATISTICAL LAW OR SIMILAR]

THIS INFORMATION IS STRICTLY CONFIDENTIAL AND IS TO BE USED FOR STATISTICAL PURPOSES ONLY.

LIVESTOCK QUESTIONNAIRE

<u>HOUSEHOLD IDENTIFICATION</u>

	CODE	NAME
1. REGION:		
2. DISTRICT		
3. WARD		
4. VILLAGE/ENUMERATION AREA		
5. NEIGHBORHOOD NAME		
6. HOUSEHOLD ID (FROM LIST) :		
7. NAME OF HOUSEHOLD HEAD:		

OBSERVATIONS ON THE INTERVIEW

RECORD GENERAL NOTES ABOUT THE INTERVIEW AND RECORD ANY SPECIAL INFORMATION THAT WILL BE HELPFUL FOR SUPERVISORS AND THE ANALYSIS OF THIS QUESTIONNAIRE.

8. NAME OF INTERVIEWER

9. INTERVIEWER ID

10. INTERVIEW START TIME

11. DATE OF INTERVIEW

DD / MM / YYYY

12. NAME OF RESPONDENT

13. RESPONDENT ID

14. NAME OF SUPERVISOR

15. SUPERVISOR ID

16. DATE OF QUESTIONNAIRE INSPECTION

DD / MM / YYYY

17. NAME OF DATA ENTRY CLERK

18. DATA ENTRY CLERK ID

19. DATE OF DATA ENTRY

DD / MM / YYYY

20. 2ND DATA ENTRY CLERK ID

21. DATE OF 2ND DATA ENTRY

DD / MM / YYYY

SECTION A: OWNERSHIP

A. OWNERSHIP

Did anyone in the household own or keep any livestock in the past 12 months?
1=Yes
0=No >> **SKIP THE LIVESTOCK MODULE**

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	Did you keep any [LIVESTOCK TYPE], irrespective of who owns [LIVESTOCK TYPE] that you keep? 1 = Yes 0 = No IF 0 >> NEXT LIVESTOCK NAME NOTE: THE OWNER(S) CAN BE WITHIN AND/OR OUTSIDE THE HOUSEHOLD	How many [LIVESTOCK TYPE] does your household currently keep? number	Of these [LIVESTOCK TYPE], how many are cross or exotic breeds? number	Who in your household is responsible for keeping/managing the [LIVESTOCK TYPE] currently kept by your household? Record person ID NOTE: LIST UP TO 2 IDs FROM THE HOUSEHOLD ROSTER		Do you and / or a member of your household own all of the [LIVESTOCK TYPE] currently kept by your household? 1 = Yes 0 = No IF 1 >> 8	How many of the [LIVESTOCK TYPE] kept by your household are owned by you or a member of your household? number	Of these [LIVESTOCK TYPE] how many are cross or exotic breeds? number	Are you among the owners of the [LIVESTOCK TYPE] currently kept by your household? 1 = Yes 0 = No
				1	2	3	4a	4b	5	6	7	8
Large ruminants	1	Bulls	1.0									
		Oxen	1.1									
		Cows	1.2									
		Steers/Heifers	1.3									
		Calves - Males/Female	1.4									
		Buffaloes	1.5									
Small ruminants	2	Goats - He/She/Kids	2.0									
		Sheep - Rams/Ewes/Lambs	2.1									
Camelids	3	Camels - He/She/Kids	3.1									
Pigs	4	Pigs - Boar/Sow/Piglets	4.1									
Poultry	5	Chicken - Cocks / Broilers	5.1									
		Chicken - Hens / Layers	5.2									
		Pullets/ DOCs	5.3									
		Other (Ducks, Geese, Guineafowls, etc.)	5.4									
Equines	6	Horses	6.1									
		Mules / Donkeys	6.2									
Other	7	Specify	7.0									

(continued)

SECTION A: OWNERSHIP

A. OWNERSHIP

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	Who (else) in your household are among the owners of the [LIVESTOCK TYPE] currently kept by your household? — Record person ID. NOTE: LIST UP TO 2 IDs FROM THE HOUSEHOLD ROSTER. IF THERE ARE NO OTHER OWNERS WITHIN THE HOUSEHOLD, WRITE CODE = 98. IF THERE ARE OWNERS OUTSIDE THE HOUSEHOLD, WRITE CODE = 99. THE QUESTION ALLOWS FOR SIMULTANEOUS USE OF THE CODES 98 AND 99, AS APPLICABLE		Do you or a member of your household own any [LIVESTOCK TYPE] that is not kept by your household? 1 = Yes 0 = No IF 0 >> 15	How many of such [LIVESTOCK TYPE] is owned by you or a member of your household? number	Of these [LIVESTOCK TYPE], how many are cross or exotic breeds? number	Are you among the owners of any of the [LIVESTOCK TYPE] that is not kept by your household? 1 = Yes 0 = No	Who (else) in your household are among the owners of the [LIVESTOCK TYPE] that is not currently kept by your household? — Record person ID. NOTE: LIST UP TO 2 IDs FROM THE HOUSEHOLD ROSTER. IF THERE ARE NO OTHER OWNERS WITHIN THE HOUSEHOLD, WRITE CODE = 98. IF THERE ARE OWNERS OUTSIDE THE HOUSEHOLD, WRITE CODE = 99. THE QUESTION ALLOWS FOR SIMULTANEOUS USE OF THE CODES 98 AND 99, AS APPLICABLE		What are the household's main reasons for owning/keeping [LIVESTOCK TYPE]? 1 = sale of live animals 2 = sale of livestock products 3 = food for the family 4 = savings and insurance 5 = social status/prestige 6 = crop agriculture (manure, draught power) 7 = transport 8 = other (specify)
				9a	9b	10	11	12	13	14a	14b	15
Large ruminants	1	Bulls	1.0									
		Oxen	1.1									
		Cows	1.2									
		Steers/Heifers	1.3									
		Calves - Males/Female	1.4									
		Buffaloes	1.5									
Small ruminants	2	Goats - He/She/Kids	2.0									
		Sheep - Rams/Ewes/Lambs	2.1									
Camelids	3	Camels - He/She/Kids	3.1									
Pigs	4	Pigs - Boar/Sow/Piglets	4.1									
Poultry	5	Chicken - Cocks / Broilers	5.1									
		Chicken - Hens / Layers	5.2									
		Pullets/ DOCs	5.3									
		Other (Ducks, Geese, Guineafowls, etc.)	5.4									
Equines	6	Horses	6.1									
		Mules / Donkeys	6.2									
Other	7	Specify	7.0									

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SECTION B: LIVESTOCK STOCK FLAP

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	KEPT [LIVESTOCK NAME] - SEE SECTION A, QUESTION 1 1 = Yes 0 = No	OWNED/KEPT [LIVESTOCK TYPE]? 1 = Yes 0 = No
Large ruminants	1	Bulls	1.0		
		Oxen	1.1		
		Cows	1.2		
		Steers/Heifers	1.3		
		Calves - Males/Female	1.4		
		Buffaloes	1.5		
Small ruminants	2	Goats - He/She/Kids	2.0		
		Sheep - Rams/Ewes/Lambs	2.1		
Camelids	3	Camels - He/She/Kids	3.1		
Pigs	4	Pigs - Boar/Sow/Piglets	4.1		
Poultry	5	Chicken - Cocks / Broilers	5.1		
		Chicken - Hens / Layers	5.2		
		Pullets/ DOCs	5.3		
		Other (Ducks, Geese, Guineafowls, etc.)	5.4		
Equines	6	Horses	6.1		
		Mules / Donkeys	6.2		
Other	7	Specify	7.0		

SECTION B1: CHANGE IN STOCK - LARGE AND MEDIUM-SIZED ANIMALS

CHECK FLAP. IF HOUSEHOLD KEPT ANY [LIVESTOCK NAME]
ASK QUESTION 16 IF NOT GO TO NEXT [LIVESTOCK NAME]

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	How many [LIVESTOCK NAME] did the household keep 12 months ago? (number)	BORN — How many [LIVESTOCK NAME] were born in the past 12 months? (number)	PURCHASES — Has this household purchased any live [LIVESTOCK NAME] in the past 12 months? 1 = Yes 0 = No IF 0 >> 21	How many [LIVESTOCK NAME] did this household buy alive in the past 12 months (number)	What was the total value of the [LIVESTOCK NAME] purchased in the past 12 months? (local currency)	GIFTS - RECEIVED & GIVEN — Has this household received any [LIVESTOCK NAME] as a gift in the past 12 months? 1 = Yes 0 = No IF 0 >> 23	How many [LIVESTOCK NAME] were received as a gift in the past 12 months? (number)	Has this household given any [LIVESTOCK NAME] as a gift in the past 12 months? 1 = Yes 0 = No IF 0 >> 25	How many [LIVESTOCK NAME] were given as a gift in the past 12 months? (number)
				16	17	18	19	20	21	22	23	24
Large ruminants	1	Bulls	1.0									
		Oxen	1.1									
		Cows	1.2									
		Steers/Heifers	1.3									
		Calves - Males/Female	1.4									
		Buffaloes	1.5									
Small ruminants	2	Goats - He/She/Kids	2.0									
		Sheep - Rams/Ewes/Lambs	2.1									
Camelids	3	Camels - He/She/Kids	3.1									
Pigs	4	Pigs - Boar/Sow/Piglets	4.1									
Poultry	5	Chicken - Cocks / Broilers	5.1									
		Chicken - Hens / Layers	5.2									
		Pullets/ DOCs	5.3									
		Other (Ducks, Geese, Guineafowls, etc.)	5.4									
Equines	6	Horses	6.1									
		Mules / Donkeys	6.2									
Other	7	Specify	7.0									

SECTION B1 - CHANGE IN STOCK - LARGE AND MEDIUM-SIZED ANIMALS

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	LOST		SALES OF LIVE ANIMALS			ANIMALS SLAUGHTERED			
				Has this household lost any [LIVESTOCK NAME] in the past 12 months? (e.g. due to disease, natural calamity, injury, theft, etc.) 1 = Yes 0 = No IF 0 >> 27	How many [LIVESTOCK NAME] were lost in the past 12 months? number	Has this household sold any [LIVESTOCK NAME] alive in the past 12 months? 1 = Yes 0 = No IF 0 >> 30	How many [LIVESTOCK NAME] has this household sold alive in the past 12 months? number	What were the total revenues from these [LIVESTOCK NAME] sales? local currency	Has this household slaughtered any [LIVESTOCK NAME] in the past 12 months? 1 = Yes 0 = No IF 0 >> NEXT LINE	How many [LIVESTOCK NAME] has this household slaughtered in the past 12 months? number	Has this household sold some of the slaughtered [LIVESTOCK NAME] or their meat in the past 12 months? 1 = Yes 0 = No IF 0 >> NEXT LINE	What were the total revenues from these sales? local currency
				25	26	27	28	29	30	31	32	33
Large ruminants	1	Bulls	1.0									
		Oxen	1.1									
		Cows	1.2									
		Steers/Heifers	1.3									
		Calves - Males/Female	1.4									
		Buffaloes	1.5									
Small ruminants	2	Goats - He/She/Kids	2.0									
		Sheep - Rams/Ewes/Lambs	2.1									
Camelids	3	Camels - He/She/Kids	3.1									
Pigs	4	Pigs - Boar/Sow/Piglets	4.1									
Poultry	5	Chicken - Cocks / Broilers	5.1									
		Chicken - Hens / Layers	5.2									
		Pullets/ DOCs	5.3									
		Other (Ducks, Geese, Guineafowls, etc.)	5.4									
Equines	6	Horses	6.1									
		Mules / Donkeys	6.2									
Other	7	Specify	7.0									

CHECK FLAP. IF HOUSEHOLD KEPT ANY [LIVESTOCK NAME] ASK QUESTION 34 IF NOT GO TO NEXT [LIVESTOCK NAME]

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	How many [LIVESTOCK NAME] did the household keep 3 months ago? (number)	BORN — How many [LIVESTOCK NAME] were born in the past 3 months? (number)	PURCHASES — Has this household purchased any live [LIVESTOCK NAME] in the past 3 months? 1 = Yes 0 = No IF 0 >> 39	How many [LIVESTOCK NAME] did this household buy alive in the past 3 months (number)	What was the total value of the [LIVESTOCK NAME] purchased in the past 3 months? (local currency)	GIFTS - RECEIVED & GIVEN — Has this household received any [LIVESTOCK NAME] as a gift in the past 3 months? 1 = Yes 0 = No IF 0 >> 41	How many [LIVESTOCK NAME] were received as a gift in the past 3 months? (number)	Has this household given any [LIVESTOCK NAME] as a gift in the past 3 months? 1 = Yes 0 = No IF 0 >> 43	How many [LIVESTOCK NAME] were given as a gift in the past 3 months? (number)
				34	35	36	37	38	39	40	41	42
Large ruminants	1	Bulls	1.0									
		Oxen	1.1									
		Cows	1.2									
		Steers/Heifers	1.3									
		Calves - Males/Female	1.4									
		Buffaloes	1.5									
Small ruminants	2	Goats - He/She/Kids	2.0									
		Sheep - Rams/Ewes/Lambs	2.1									
Camelids	3	Camels - He/She/Kids	3.1									
Pigs	4	Pigs - Boar/Sow/Piglets	4.1									
Poultry	5	Chicken - Cocks / Broilers	5.1									
		Chicken - Hens / Layers	5.2									
		Pullets/ DOCs	5.3									
		Other (Ducks, Geese, Guineafowls, etc.)	5.4									
Equines	6	Horses	6.1									
		Mules / Donkeys	6.2									
Other	7	Specify ………………	7.0									

SECTION B2: CHANGE IN STOCK - POULTRY

				LOST		SALES OF LIVE ANIMALS			ANIMALS SLAUGHTERED			
LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	Has this household lost any [LIVE-STOCK NAME] in the past 3 months? (e.g. due to disease, natural calamity, injury, theft, etc.) 1 = Yes 0 = No IF 0 >> 45	How many [LIVESTOCK NAME] were lost in the past 3 months? number	Has this household sold any [LIVESTOCK NAME] alive in the past 3 months? 1 = Yes 0 = No IF 0 >> 48	How many [LIVESTOCK NAME] has this household sold alive in the past 3 months? number	What were the total revenues from these [LIVESTOCK NAME] sales? local cur-rency	Has this household slaughtered any [LIVE-STOCK NAME] in the past 3 months? 1 = Yes 0 = No IF 0 >> NEXT LINE	How many [LIVESTOCK NAME] has this household slaughtered in the past 3 months? number	Has this household sold some of the slaughtered [LIVE-STOCK NAME] or meat in the past 3 months? 1 = Yes 0 = No IF 0 >> NEXT LINE	What were the total revenues from these sales? local currency
				43	44	45	46	47	48	49	50	51
Large ruminants	1	Bulls	1.0									
		Oxen	1.1									
		Cows	1.2									
		Steers/Heifers	1.3									
		Calves - Males/Female	1.4									
		Buffaloes	1.5									
Small ruminants	2	Goats - He/She/Kids	2.0									
		Sheep - Rams/Ewes/Lambs	2.1									
Camelids	3	Camels - He/She/Kids	3.1									
Pigs	4	Pigs - Boar/Sow/Piglets	4.1									
Poultry	5	Chicken - Cocks / Broilers	5.1									
		Chicken - Hens / Layers	5.2									
		Pullets/ DOCs	5.3									
		Other (Ducks, Geese, Guineafowls, etc.)	5.4									
Equines	6	Horses	6.1									
		Mules / Donkeys	6.2									
Other	7	Specify	7.0									

CHECK FLAP. IF HOUSEHOLD KEPT ANY [LIVESTOCK TYPE] ASK QUESTION 52 IF NOT GO TO NEXT [LIVESTOCK TYPE]

BREEDING

HOUSING

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	Has this household practiced any controlled mating or other breeding strategy (such as selection of reproductive animal, artificial insemination etc.) for [LIVESTOCK TYPE] in the past 12 months — 1 = Yes, 0 = No, IF 0 >> 56 (52)	What has been the main controlled mating or breeding strategy used by this household for [LIVESTOCK TYPE] in the past 12 months? SEE BREEDING CODES (53)	Has this household incurred any cost related to breeding [LIVESTOCK TYPE]? 1 = Yes, 0 = No, IF 0 >> 56 (54)	How much did this household spend in total over the last 12 months for breeding [LIVESTOCK TYPE]? local currency (55)	What housing system for [LIVESTOCK TYPE] has this household mainly used in the past 12 months? 1 = none; 2 = confined in sheds; 3 = confined in paddocks; 4 = confined fences; 5 = cage; 6 = basket; 7 = inside the house (e.g. kitchen); 8 = other (specify) (56)
Large ruminants	1	Bulls	1.0					
		Oxen	1.1					
		Cows	1.2					
		Steers/Heifers	1.3					
		Calves - Males/Female	1.4					
		Buffaloes	1.5					
Small ruminants	2	Goats - He/She/Kids	2.0					
		Sheep - Rams/Ewes/Lambs	2.1					
Camelids	3	Camels - He/She/Kids	3.1					
Pigs	4	Pigs - Boar/Sow/Piglets	4.1					
Poultry	5	Chicken - Cocks / Broilers	5.1					
		Chicken - Hens / Layers	5.2					
		Pullets / DOCs	5.3					
		Other (Ducks, Geese, Guineafowls, etc.)	5.4					
Equines	6	Horses	6.1					
		Mules / Donkeys	6.2					
Other	7	Specify	7.0					

SECTION C: BREEDING, HOUSING, WATER, FEED & HIRED LABOR — **WATERING**

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	Who in this household was responsible for watering the [LIVESTOCK TYPE] in the past 12 months? Record person ID — 57	How frequently has this household watered [LIVESTOCK TYPE] in the past 12 month? 1 = animals get on their own from available sources / 2 = once a day / 3 = more than once a day 1st season 58a	2nd season 58b	What has been the main source of water for [LIVESTOCK TYPE] in the past 12 months? 1 = borehole / 2 = dam / 3 = well / 4 = river/spring/stream / 5 = rainwater harvesting / 6 = other (specify) 1st season 59a	2nd season 59b	Has this household paid for the water for [LIVESTOCK TYPE]? 1 = Yes / 0 = No / IF 0 >>61 1st season 60a	2nd season 60b	How much has this household paid for water for [LIVESTOCK TYPE] local currency 61
Large ruminants	1	Bulls	1.0								
		Oxen	1.1								
		Cows	1.2								
		Steers/Heifers	1.3								
		Calves - Males/Female	1.4								
		Buffaloes	1.5								
Small ruminants	2	Goats - He/She/Kids	2.0								
		Sheep - Rams/Ewes/Lambs	2.1								
Camelids	3	Camels - He/She/Kids	3.1								
Pigs	4	Pigs - Boar/Sow/Piglets	4.1								
Poultry	5	Chicken - Cocks / Broilers	5.1								
		Chicken - Hens / Layers	5.2								
		Pullets/DOCs	5.3								
		Other (Ducks, Geese, Guineafowls, etc.)	5.4								
Equines	6	Horses	6.1								
		Mules / Donkeys	6.2								
Other	7	Specify	7.0								

(continued)

SECTION C: BREEDING, HOUSING, WATER, FEED & HIRED LABOR

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	**FEEDING** Who in this household was responsible for feeding the [LIVESTOCK TYPE] in the past 12 months? (person ID) 62	What have been for this household the major feeding practices for [LIVESTOCK TYPE] in the past 12 months? (1 = only grazing/scavenging 2 = mainly grazing/scavenging, some feeding 3 = mainly feeding, some grazing/scavenging 4 = only feeding (zero grazing/scavenging) 5 = other (specify)) 1st season 63a	2nd season 63b	Has this household purchased any fodder / crop residues / industrial by-products / roots & tubers / balanced contrates / feed supplements for [LIVESTOCK TYPE] in the past 12 months? (1 = Yes, 0 = No, IF 0 >> 66) 1st season 64a	2nd season 64b	How much has this household spent to purchase fodder / crop residues / industrial by-products / roots & tubers / balanced contrates / feed supplements for [LIVESTOCK TYPE] in the past 12 months? (local currency) 1st season 65a	2nd season 65b	**HIRED LABOR** Did you hire any labor to help you with livestock keeping over the past 12 months? (1 = Yes, 0 = No, IF 0 >> NEXT LINE) 66	What was the total cost of the labor you hired for keeping livestock over the past 12 months? (local currency) 67
Large ruminants	1	Bulls	1.0									
		Oxen	1.1									
		Cows	1.2									
		Steers/Heifers	1.3									
		Calves - Males/Female	1.4									
		Buffaloes	1.5									
Small ruminants	2	Goats - He/She/Kids	2.0									
		Sheep - Rams/Ewes/Lambs	2.1									
Camelids	3	Camels - He/She/Kids	3.1									
Pigs	4	Pigs - Boar/Sow/Piglets	4.1									
Poultry	5	Chicken - Cocks / Broilers	5.1									
		Chicken - Hens / Layers	5.2									
		Pullets/ DOCs	5.3									
		Other (Ducks, Geese, Guineafowls, etc.)	5.4									
Equines	6	Horses	6.1									
		Mules / Donkeys	6.2									
Other	7	Specify	7.0									

SECTION D: ANIMAL HEALTH

CHECK FLAP. IF HOUSEHOLD KEPT ANY [LIVESTOCK TYPE]
ASK QUESTION 68 IF NOT GO TO NEXT [LIVESTOCK TYPE]

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	Did [LIVESTOCK TYPE] suffer any disease in the past 12 months? 1 = Yes 0 = No IF 0 >> 70	What kind of disease did affect [LIVESTOCK TYPE] in the past 12 months? SEE DISEASE CODES	Has this household vaccinated any [LIVESTOCK TYPE] in the past 12 months? 1 = Yes 0 = No IF 0 >> 72	Against which diseases are the [LIVESTOCK TYPE] vaccinated? SEE VACCINATION CODES 71a	71b	71c	71d	During the last 12 months has this household treated any [LIVESTOCK TYPE] against internal parasites? 1 = Yes 0 = No IF 0 >> NEXT LINE	During the last 12 months has this household treated [LIVESTOCK TYPE] against external parasites? 1 = Yes 0 = No CHECK IF QQ. 72,73 BOTH ARE = 0 >>75	During the last 12 months how much did this household spend on vaccines and treatments against internal and / external and / external parasites for [LIVESTOCK TYPE]? local currency	During the last 12 months have the [LIVESTOCK TYPE] in this household received any curative treatment? 1 = Yes 0 = No IF 0 >> NEXT LINE	During the last 12 months how much did this household spend in total on curative treatments? local currency
				68	69	70	71a	71b	71c	71d	72	73	74	75	76
Large ruminants	1	Bulls	1.0												
		Oxen	1.1												
		Cows	1.2												
		Steers/Heifers	1.3												
		Calves - Males/Female	1.4												
		Buffaloes	1.5												
Small ruminants	2	Goats - He/She/Kids	2.0												
		Sheep - Rams/Ewes/Lambs	2.1												
Camelids	3	Camels - He/She/Kids	3.1												
Pigs	4	Pigs - Boar/Sow/Piglets	4.1												
Poultry	5	Chicken - Cocks / Broilers	5.1												
		Chicken - Hens / Layers	5.2												
		Pullets/ DOCs	5.3												
		Other (Ducks, Geese, Guineafowls, etc.)	5.4												
Equines	6	Horses	6.1												
		Mules / Donkeys	6.2												
Other	7	Specify	7.0												

SECTION E: MILK PRODUCTION (OFF-TAKE)

CHECK FLAP. IF HOUSEHOLD KEPT ANY [LIVESTOCK NAME]
ASK QUESTION 77 IF NOT GO TO NEXT [LIVESTOCK NAME]

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	Did you milk any [LIVESTOCK TYPE] in the last 12 months? 1 = Yes 0 = No IF 0 >>NEXT LINE	For how many months on average were [LIVESTOCK TYPE] milked in the past 12 months? number	During these months in which [LIVESTOCK TYPE] were milked, how many animals were milked on average each month? number	During these months in which [LIVESTOCK TYPE] were milked, what was the average quantity of milk milked per day from the [LIVESTOCK TYPE] herd? litres	Who in your household mainly milked the [LIVESTOCK TYPE] in the past 12 months? Record person ID	What was the main use of the milk of [LIVESTOCK TYPE]? 1 = self consumption 2 = sale 3 = processing 4 = other (specify)	During these months in which animals were milked, how much of the [LIVESTOCK TYPE] milk collected did this household consume per week? litres	During these months in which animals were milked, did this household sell the milk of [LIVESTOCK TYPE]? 1 = Yes 0 = No IF 0 >> NEXT LINE	During these months in which animals were milked, how much of the milk of [LIVESTOCK TYPE] milked did you sell per week? litres	During these months in which animals were milked, how much did you earn from selling [LIVESTOCK TYPE] milk per week? local currency
				77	78	79	80	81	82	83	84	85	86
Large ruminants	1	Bulls	1.0										
		Oxen	1.1										
		Cows	1.2										
		Steers/Heifers	1.3										
		Calves - Males/Female	1.4										
		Buffaloes	1.5										
Small ruminants	2	Goats - He/She/Kids	2.0										
		Sheep - Rams/Ewes/Lambs	2.1										
Camelids	3	Camels - He/She/Kids	3.1										
Pigs	4	Pigs - Boar/Sow/Piglets	4.1										
Poultry	5	Chicken - Cocks / Broilers	5.1										
		Chicken - Hens / Layers	5.2										
		Pullets/ DOCs	5.3										
		Other (Ducks, Geese, Guineafowls, etc.)	5.4										
Equines	6	Horses	6.1										
		Mules / Donkeys	6.2										
Other	7	Specify	7.0										

SECTION F: EGG PRODUCTION

CHECK FLAP. IF HOUSEHOLD KEPT ANY [LIVESTOCK NAME] ASK QUESTION 87 IF NOT GO TO NEXT [LIVESTOCK NAME]

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	Has any [POULTRY] in household kept produced any eggs in the past 12 months? 1 = Yes 0=No IF 0 >> NEXT LINE	How many clutching periods did [POULTRY] have on average in the last 12 months? number	How many eggs per clutching did [POULTRY] lay on average in the last clutching period? number	How many [POULTRY] had their clutching period in the past 3 months? number	Did this household sell the [POULTRY] eggs in the last 3 months? 1 = Yes 0 = No IF 0 >> NEXT LINE	How many of the [POULTRY] eggs produced did you sell in the last 3 months? number	Who in the hosuehold did sell the [POULTRY] eggs? Record person ID	How much has this household earned by selling [POULTRY] eggs in the past 3 months? local currency
				87	88	89	90	91	92	93	94
Large ruminants	1	Bulls	1.0								
		Oxen	1.1								
		Cows	1.2								
		Steers/Heifers	1.3								
		Calves - Males/Female	1.4								
		Buffaloes	1.5								
Small ruminants	2	Goats - He/She/Kids	2.0								
		Sheep - Rams/Ewes/Lambs	2.1								
Camelids	3	Camels - He/She/Kids	3.1								
Pigs	4	Pigs - Boar/Sow/Piglets	4.1								
Poultry	5	Chicken - Cocks / Broilers	5.1								
		Chicken - Hens / Layers	5.2								
		Pullets/ DOCs	5.3								
		Other (Ducks, Geese, Guineafowls, etc.)	5.4								
Equines	6	Horses	6.1								
		Mules / Donkeys	6.2								
Other	7	Specify	7.0								

CHECK FLAP. IF HOUSEHOLD KEPT ANY [LIVESTOCK TYPE] ASK QUESTION 95 IF NOT GO TO NEXT [LIVESTOCK TYPE]

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	Has this household used any of its [LIVESTOCK TYPE] for animal power (e.g. ploughing, transport) past 12 months? 1 = Yes 0 = No IF 0 >> NEXT LINE	Which have been the main use of [LIVESTOCK TYPE] power in the last 12 months 1 = transport 2 = crop agriculture (ploughing, seeding, weeding, threshing, milling) 3. Other (specify)		Has this household used any of [LIVESTOCK TYPE] to provide services (e.g. ploughing, transport) to other households? 1 = Yes 0 = No IF 0 >> NEXT LINE	How much has this household earned by providing services with [LIVESTOCK TYPE] in the past 12 months? local currency
					1st season 96a	2nd season 96b		
				95	96a	96b	97	98
Large ruminants	1	Bulls	1.0					
		Oxen	1.1					
		Cows	1.2					
		Steers/Heifers	1.3					
		Calves - Males/Female	1.4					
		Buffaloes	1.5					
Small ruminants	2	Goats - He/She/Kids	2.0					
		Sheep - Rams/Ewes/Lambs	2.1					
Camelids	3	Camels - He/She/Kids	3.1					
Pigs	4	Pigs - Boar/Sow/Piglets	4.1					
Poultry	5	Chicken - cocks / broilers	5.1					
		Chicken - hens / layers	5.2					
		Pullets/DOCs	5.3					
		Other - (Ducks, Geese, Guineafowls, etc.)	5.4					
Equines	6	Horses	6.1					
		Mules / Donkeys	6.2					
Other	7	Specify	7.0					

SECTION H: ANIMAL DUNG

CHECK FLAP. IF HOUSEHOLD KEPT ANY [LIVESTOCK TYPE]
ASK QUESTION 99 IF NOT GO TO NEXT [LIVESTOCK TYPE]

LIVESTOCK TYPE	CODE LS TYPE	LIVESTOCK NAME	CODE LS NAME	Has this household made any use of the dung produced by [LIVESTOCK TYPE] in the past 12 months? 1 = Yes 0 = No IF 0 >> NEXT ANIMAL	Which have been the main use of the dung produced by [LIVESTOCK TYPE] in the last 12 months? 1 = manure (grazing on the plot or collected and applied) 2 = fuel 3 = construction material 4 = feed to other animals 5 = sale 6 = other (specify)		Did this household sell the dung produced by [LIVESTOCK TYPE] in the last 12 months? 1 = Yes 0 = No IF 0 >> NEXT ANIMAL	How much has this household earned from the sales of dung produced by [LIVESTOCK TYPE] in the past 12 months? local currency
				99	100a	100b	101	102
Large ruminants	1	Bulls	1.0					
		Oxen	1.1					
		Cows	1.2					
		Steers/Heifers	1.3					
		Calves - Males/Female	1.4					
		Buffaloes	1.5					
Small ruminants	2	Goats - He/She/Kids	2.0					
		Sheep - Rams/Ewes/Lambs	2.1					
Camelids	3	Camels - He/She/Kids	3.1					
Pigs	4	Pigs - Boar/Sow/Piglets	4.1					
Poultry	5	Chicken - Cocks / Broilers	5.1					
		Chicken - Hens / Layers	5.2					
		Pullets/ DOCs	5.3					
		Other (Ducks, Geese, Guineafowls, etc.)	5.4					
Equines	6	Horses	6.1					
		Mules / Donkeys	6.2					
Other	7	Specify	7.0					

CODES FOR SECTIONS C AND D

BREEDING CODES FOR Q 53
Natural Mating, Sire Selected from within the herd.......1
Natural Mating, Sire Purchased or exchanged..............2
Natural Mating, Non-Breeding Males Castrated............3
Natural Mating, Dam Purchased.....................................4
Artificial Insemination..5
Other (Specify)..6

CODES FOR Q69 (Diseases)
Brucelosis....................................1
CBPP 2
Lumpy Skin Disease 3
CCPP 4
ECF...5
Rabies..6
FMD...7
Anthrax......................................8
Black Quarter (BQ)......................9
New castle Disease 10
Small Pox..................................11
Gomboro...................................12
Helminthiosis 13
ASF...13
Tick Borne Disease 15
Typanosomiasis........................16

CODES FOR Q71 (Vaccinations)
Brucelosis....................................1
CBPP 2
Lumpy Skin Disease 3
CCPP 4
ECF...5
Rabies..6
FMD...7
Anthrax......................................8
BQ..9
New castle Disease 10
Small Pox..................................11
Gomboro...................................12
Other, specify 13

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