



# A transformative One Health agenda for livestock dependent communities

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# A transformative One Health agenda for livestock dependent communities

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## About GLAD

The Global Livestock Advocacy for Development (GLAD) project provides compelling evidence to help influential decision makers understand why and how investing in sustainable livestock systems and enterprises in low- and middle-income countries contributes to achieving the Sustainable Development Goals. It engages with a range of stakeholders and partners to advocate for sustainable livestock. Visit <https://whylivestockmatter.org>

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# I The case for a transformative agenda

## 1 The context for change

In the first two decades of the 21st century the global health challenges of the Anthropocene have become both more apparent and more urgent. COVID-19, antimicrobial resistance (AMR), climate change and inequity were shown to be made up of multiple, simultaneous challenges that interact to pull humanity closer to critical tipping points. As a result, many agencies are wrestling with the substantial task of trading off community nutrition and health, livestock production and environmental protection. Such a task will become increasingly hard as the demand for livestock products increases (Herrero et al. 2009). Responses to today's challenges that take place after harms occur and in disciplinary silos have been unable to make headway. Transformative changes are needed to accelerate and amplify innovations to protect health and make investments more impactful, sustainable and equitable.

The transformative One Health agenda for livestock dependent communities outlined in this document is based on two evidence-backed propositions:

1. Interventions to improve livestock health are powerful because they are 'multi-solving'.
2. Better livestock health will only lead to better health for all if health equity is also promoted and the interdependence of human, livestock and ecosystem health is recognized.

Livestock are a key asset that help many communities, including some of the world's most vulnerable, deal with a changing and uncertain future. Empowering communities to protect and promote animal health and welfare improves livelihoods while building social and ecological resilience to endemic and emerging threats (Nijsane et al. 2020). This is the multi-solving power of livestock. However, livestock health is being increasingly constrained by changing production methods, competition for food, water and resources, endemic and emerging diseases and a rapidly changing environment (Thornton 2010). Understanding the causes and impacts of diseases can be accomplished by disciplinary experts, but building robust, healthy, resilient livestock systems in a rapidly changing world is a multifaceted undertaking requiring multidisciplinary teams (De Goede et al. 2013).

In a world of concurrent health, societal and environmental problems, unique solutions for each problem are neither feasible nor effective (Fried et al. 2012). Unconnected approaches to managing the health of people, livestock and environments are failing to meet today's complex health challenges and are proving to be unsustainable (Kock et al. 2018). One Health is a pathway to synergistically address health and sustainability (Garnier et al. 2020).

This document proposes a transformative One Health agenda to keep people, livestock and ecosystems healthy in the face of current adverse conditions while making them better able to cope with today's rapid changes. It introduces a way to transform health systems by integrating them. This way is neither 'human first' nor 'animal first' nor 'environment first',

but ‘all together’. The document offers a livestock lens to explore ways to make One Health initiatives more impactful, efficient and sustainable – not because livestock are the most important factor in One Health, but rather because livestock are among the most readily available instruments that we have at hand for achieving One Health.

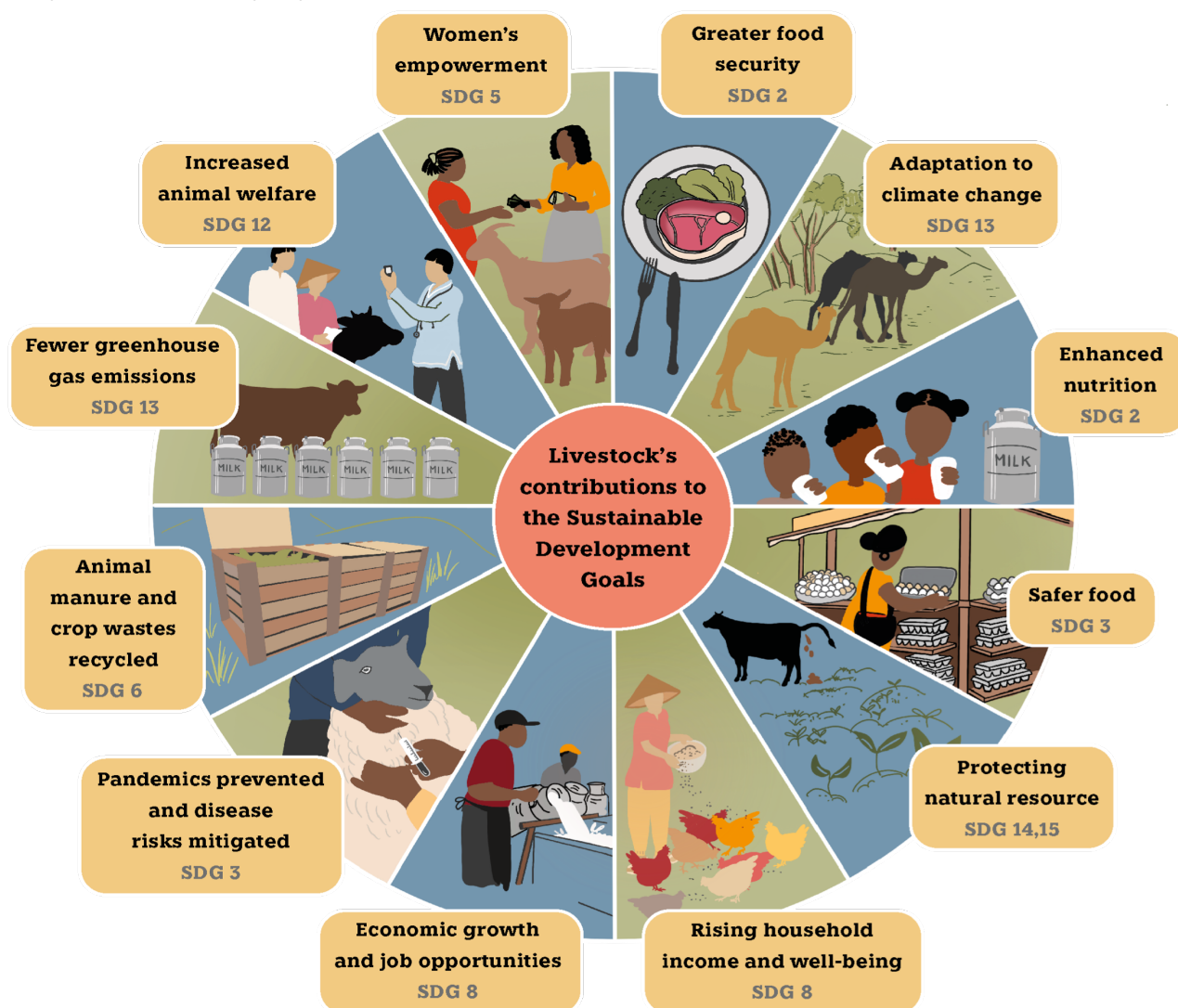
The transformative agenda proposed has three aims:

1. To identify solutions that can address the current, pressing problems of livestock dependent people.
2. To learn how to spread the benefits of these solutions broadly over time and place.
3. To help livestock-based communities worldwide prepare for and cope with emerging and future threats to their diverse and changing environments and other threats to their health and well-being.

## 2 Community resilience through healthy livestock

Promoting livestock health and welfare is ‘multi-solving’. Healthy livestock support healthy livestock systems and landscapes and build societal capacity to cope with current and future threats.

Figure 1. The multi-solving power of livestock. Healthy livestock positively influence individual, community and ecosystem health in many ways.



Community resilience is built by protecting community health and well-being, ensuring community members can access and use their economic, social and natural capital and ensuring communities have options to transform in times of change (Wulff et al. 2015). Livestock rearing touches on all these features in livestock dependent households and communities (ex. Stroebel et al. 2011; Maass et al. 2012; Hoelle 2012; Glass et al. 2014; Mosites et al. 2015). Animals have a prominent place in livestock farmers' health circumstances (Randolph et al. 2007), including for millions of the world's most vulnerable people. Livestock provide people with food and income. They affect the nature and extent of diseases families encounter. Livestock modify ecosystem services upon which they and communities depend and provide social capital and spiritual support for many people. Animal health and welfare affects animal productivity, animal product quality and food safety and security, which in turn affect human health and community livelihoods (Sinclair et al. 2019). Multisectoral interactions across agriculture, health and environment can identify pathways to rural poverty reduction and consumer well-being (Johns et al. 2013).

Livestock provide many benefits to society, but at the same time generate considerable pressure on land, water, climate, wild plants and wild animals (Steinfeld et al. 2006; Herrero et al. 2010). The anticipated growth in demand for meat and intensified smallholder farming, coupled with increasing competition for resources (FAO 2017), makes promoting the reciprocal maintenance of community, livestock and ecosystem health a pressing issue today.

Animal suffering, death and disease create involuntary constraints on the nutritional gains, income or social capital on which their owners depend (Otiang et al. 2020). Poor animal welfare can amplify livestock infectious disease, promote food safety risks, increase shedding of pathogens by farm animals and result in more antibiotic use and antibiotic resistance (De Passillé et al. 2005).

Livestock health is determined by whether animals can access their needs for daily living, cope with stress and change and meet societal expectations of them (Card et al. 2018; Wittrock et al. 2019; Snyder-Mackler et al. 2020; Stephen 2020). Livestock health cannot be promoted or sustained without equal attention being paid to the health of local communities, broader society and ecosystems. The historic, hazard-by-hazard approach to risk management, in which each new threat (e.g. infectious disease, drought, famine, economic collapse) is tackled independently, often within and not across sectors, is insufficient to ensure preparedness when the next hazard cannot be predicted and when multiple threats are compounding each other (Stephen 2020b).

## 3 A transformative One Health agenda for livestock dependent communities

To keep pace with the unprecedented rate of persistent and emerging health threats, innovative knowledge creation and knowledge dissemination are urgently needed.

### 3.1 The vision

The goal of this transformative One Health agenda is to keep people, livestock and ecosystems healthy in the face of adverse conditions while making them better able to cope with unprecedented changes. Its vision is to promote equitable, sustainable and safe access to the health opportunities with which livestock provide communities by protecting livestock health and the ecosystems upon which all species depend. The vision can be achieved by promoting systemic, purposeful and fair access to the benefits healthy livestock bring communities by taking action and doing research to better understand what works, for whom and in what circumstances.

**One Health can help humanity manage and address the global health security threats and environmental crises tied to human development, including pandemic infections, climate change, poverty and growing inequity.** To be sustainable, actions that prioritize short-term human benefit must not compromise future well-being by diminishing opportunities for other people, animals or future generations to benefit from healthy human, animal and environment relationships. One Health investments need to concurrently build livestock health and welfare in advance of new threats while creating the systems to detect and remedy existing harms.

The need to increase livestock productivity and incomes of poor communities while protecting the sovereignty of nomadic and indigenous peoples and lands, ensuring safe animal products and moderating the ecological footprint of production systems requires an approach that ensures all sides can present their case, share their knowledge and collaborate on mutually beneficial solutions.

## 4 Priorities for the transformative change

This agenda prioritizes livestock health, reciprocal health and equitable health. By knowing what actions work for whom and under what circumstances we will be better able to address health challenges today and prepare for future threats.

The following priority areas must be supported by investment in knowledge-to-action research to ensure innovations can be customized to the individual circumstances of diverse communities around the globe.

**Livestock health.** Livestock health and welfare are ‘multi-solving’ and provide the raw materials for resilience and robustness to a wide variety of threats (Friggens et al. 2017). One Health needs to promote health and welfare in advance of harms and in partnership with those who can influence local policies and practices (Wulff et al. 2015) that resonate with the farmers who ultimately control livestock health. Livestock health promotion enables people to recognize and respond to health threats and fosters collaborations across all sectors to create the social, environmental and biological conditions to support and maintain healthy animals and people.

**Reciprocal health.** Trade-offs between environmental protection and livestock production will increase significantly in the future of increased demand for livestock products (Herrero et al. 2009). Diminished animal health leads to diminished human and ecosystem health. These trade-offs must be confronted before irreversible ecosystem damage occurs. Empowering people to protect their and their animals’ health while protecting the benefits the environment provides, requires new policies and practices to improve environmental sustainability, health and equity at the same time (Bell et al. 2019).

### Investment opportunity 1

- Initiatives to promote and protect livestock health and welfare.
- *To ensure sustainable livestock assets for community health.*

### Investment opportunity 2

- Create spaces and platforms to bring together different sectors.
- *To develop win-win-win solutions that benefit people, livestock and ecosystems.*



**Equitable health.** Persistent inequities cause some people to be systematically disadvantaged in their capacity to improve the health of their animals and themselves. The contributions of livestock to community and individual well-being in low- and middle-income countries (LMICs) are threatened where poorer countries are experiencing static or deteriorating animal health (Perry et al. 2013). The globalization of the threats from climate change, disease and environmental degradation compounds this problem. To tackle inequity, we must understand and address how health issues – livestock as well as human – variously affect different population groups. Ensuring people today and tomorrow have fair opportunities to access the health benefits from livestock requires purposely engaging with and supporting sectors of society that are systematically disadvantaged, including women, rural communities and poor people.

### Investment opportunity 3

- Sustained engagement and rigorous study of how One Health actions and knowledge influence health equity.
- *To identify the enablers of, and obstacles to, healthy livestock systems and enable fair distribution of their benefits (Craddock and Hinchliffe 2015).*

## 5 Attacking the problems of the problems

Significant efficiencies can be found by addressing the shared causes of diverse threats and investing in widespread, multi-solving actions.

In today's world of multiplying challenges, agencies established to deal with these problems can quickly become overwhelmed. New threats are frequently added to already long lists of existing hazards and persistent obstacles to optimum health for people, livestock and ecosystems. Managing resilience in livestock dependent communities without regard for the role of livestock health and the health of supporting ecosystems cannot succeed in the long term. Without transformation to address the root causes of these multiple challenges (the problems of the problems), we will continue to battle new crises as they emerge.

A new approach that confronts the barriers to integrating health across species, spaces and time is needed to respond to the following: health care systems and society cannot keep pace with the rapid changes distorting human, livestock and environment connections; the pressures and expectations of One Health are rapidly outpacing its traditional scope of practice which limits it to infectious diseases at the human-animal interface; and the pressures facing livestock producers are multiplying and compounding each other, threatening the contributions livestock make to healthy communities.

These demand investments to:

- accelerate and amplify **innovations** to make One Health investments in livestock communities more impactful, sustainable, equitable and available;
- develop and nurture new **partnerships, teams, expertise and approaches** to protect and promote healthy human, animal and environmental co-dependencies in the face of global changes; and
- identify and implement **multi-solving actions** to protect and promote livestock health and that are suitable and adaptable to local circumstances to build resilience against a changing future while dealing with the challenges of today.

### 5.1 Closing the knowing-to-doing gap

There is wide-ranging and growing commitment to One Health as an approach to improve health, but its operationalization has been challenging (Lee and Brumme 2013). Global threats are making it clear that human health needs will rapidly outstrip resources if the focus remains on the status quo (Smith 2018). Communities confronted with

persistent and pressing problems require innovative, locally developed One Health solutions and mitigation strategies. Recent attention to One Health at high-level political fora has increased power struggles between dominant stakeholders in a context where investment in collaboration is lacking (Spencer et al. 2019). Guidance is needed on how to both generalize local experiences and tailor global practices on how to best build, deploy, multiply and adapt multisectoral teams and resources in collaborative and impactful ways.

#### Investment opportunity 4

- Collaborative approaches to bridge the knowing-to-doing gap between knowledge producers and knowledge users.
- *To identify the right questions to ask to produce credible and trustworthy evidence that can be translated into feasible, acceptable and sustainable solutions.*

#### Investment opportunity 5

- Further innovation to clarify, reinforce and magnify locally developed approaches and facilitate their diffusion and adaptation to other settings in a timely fashion.
- *To create global solutions.*

#### Investment opportunity 6

- Collaborative approaches to bridge the knowing-to-doing gap between knowledge producers and knowledge users.
- *To identify the right questions to ask to produce credible and trustworthy evidence that can be translated into feasible, acceptable and sustainable solutions.*

## 6 One Health as a vehicle for multi-solving actions

Threats to optimal health and well-being are as much the result of the circumstances of living as they are the chemical or biological hazards that make us ill. The root causes of poor health and well-being cannot be solved without addressing the underlying social and environmental context of living through multi-sectoral approaches (WHO 2018). One Health encourages multiple sectors to work together to design and implement programs, policies and legislation and research to achieve optimal health outcomes for people, animals and their shared environments by recognizing their interdependence. By working together, partners combine strengths to leverage knowledge, expertise, reach and resources as they work toward better health outcomes for all.

A transformative One Health agenda involves more than integrating human and animal health care systems for better disease control. It provides a mechanism for building a system of interdependent and mutually supportive actions to promote the health and resilience of people, animals and ecosystems.

One Health approaches have historically been used to respond to known infectious disease problems at the human-animal interface. Expectations for One Health are rapidly escalating to build resilience against persistent and complex issues such as climate change, pandemic prevention, sustainable human development and food security that have proven difficult to resolve using established approaches.

A One Health approach is adaptable to a wide range of local solutions to enhance emergency responses, reduce vulnerability to emerging threats and increase resilience to complex and persistent challenges (Rabinowitz et al. 2018). While political and global commitment to One Health is needed, its findings and emerging solutions need to translate at every level, from the farmer and local health provider who act to protect health to the politicians who provide an enabling environment for those actions to occur. More important than the more timely, complete and accurate information One Health collaborations can generate, or the potential efficiencies gained in collaborative program delivery, is the possibility One Health has for innovation. Removing disciplinary barriers is a prerequisite to promote innovative scientific approaches (Aragrande et al. 2015). Unfortunately, remaining barriers to integration across human, animal and environment health domains limit the contribution of One Health to the global health security and sustainable development agendas.

## 7 From problems to actions—priorities for transformation

One Health provides the foundation needed for innovation. A transformative One Health agenda ‘thinks big, starts small and scales fast’ so that society can learn to protect healthy human-livestock-environment relationships while attending to the harms that poor relationships create.

In Section 5 above, three investment themes are proposed. Each gives rise to critical questions which in turn highlight priorities for action (Table 1).

Table 1. Investment themes, questions and action priorities

	Investments	Questions	Action priorities
1	Accelerate and amplify <b>innovations</b> to make One Health investments in livestock communities more impactful, sustainable, equitable and available.	How do we ensure timely and regular amplification of local innovations to accelerate the diffusion of innovation and health benefits arising from One Health work in livestock systems?	Implementation of science and program evaluation innovations to better understand what works for whom and under which circumstances to translate local success into global progress.
2	New <b>partnerships, teams, expertise and approaches</b> to protect and promote healthy human, animal and environmental co-dependencies in the face of global change.	How can disparities in the access to and use of health benefits from One Health interventions be reduced or avoided?	Social and environmental sciences in One Health to advance health equity and ecological justice for people, animals and their environments.
3	<b>Multi-solving actions</b> to protect and promote livestock health and that are suitable and adaptable to local circumstances to build resilience against a changing future while dealing with the challenges of today.	How can we make progress on persistent yet avoidable barriers to human health and well-being that arise from poor livestock health?	Local One Health policy and practice innovations for effective, acceptable, transferrable and sustainable progress on AMR, food safety, endemic livestock diseases, emerging disease and environmental impacts related to livestock production in LMICs.

To effectively act on these needs, One Health investments must:

1. be applied where actions and interventions can be adapted to the conditions experienced by the populations of concern;
2. inspire effective, ethical and sustainable actions to address complex problems in real-world settings, rather than only discovering underlying causes of disease; and
3. focus on accelerating the integration of research with policy and practices to promote sustainable and adaptable actions.

### Investment opportunity 7

- New methods to overcome obstacles and make better use of opportunities.
- *To expand the scope and scale of health impacts across place and time and do so with a rich understanding of the social and ecological context.*

This transformative One Health agenda challenges researchers, policymakers and health providers to make better use of what we already know by bringing in a broader scope of knowledge from communities and social and environmental sciences through new means to collaborate and share knowledge.

## 7.1 Empowering transformation

Innovation is the process of taking knowledge and making it valuable to stakeholders (Stikeleather and Masys 2020). Human, livestock and ecosystem health and resilience need to be built by design and in partnership with those who can influence locally adaptable policies and practices. This requires us to close the knowing-to-doing gap by systematically understanding which One Health actions and interventions are feasible, acceptable, impactful, equitable and sustainable within which social and environmental contexts.

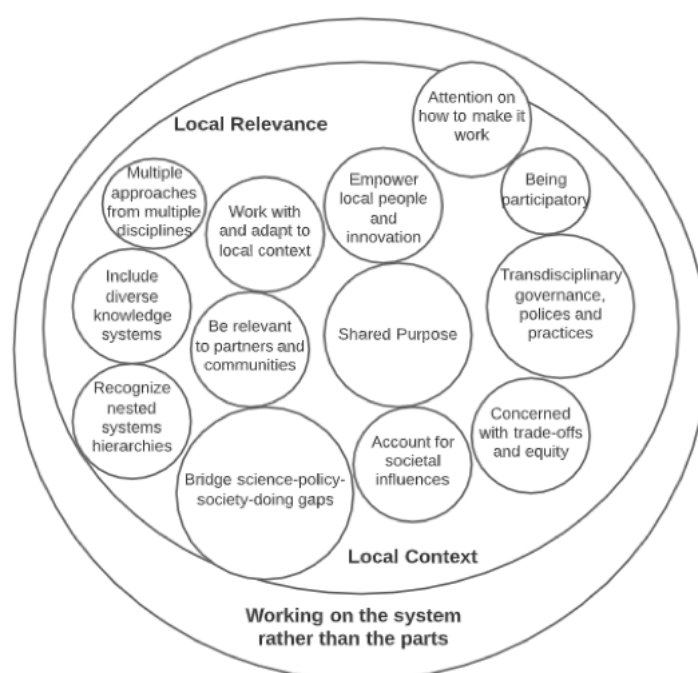
### Investment opportunity 8

- Amplification of what we know works, enabling what needs to be done.
- *To help people gain greater control over the decisions affecting their lives and the health of their livestock and shared environments.*

## 7.2 Building on past success

One Health projects and programs have resulted in more efficient and effective responses to health threats than single-sector solutions and are having increasing impact on persistent and complex health problems at the interface of people, animals and ecosystems (see Appendix 1 for examples of success). Programs that have successfully met their goals and made tangible change share several features (Zinstagg et al. 2020; Gallagher et al. 2021). In particular, successful One Health projects work on the system rather than the individual parts and are relevant to the local context in which they are applied. Other features of success include participation, shared purpose and ability to span the policy-action gap (Figure 2).

Figure 2. Attributes of One Health programs that have successfully achieved goals for action on persistent and complex problems.





Effective risk management at the human-livestock-environment nexus must consider how social and environmental circumstances interact to influence, modify, facilitate or constrain how an intervention is implemented and its impact (May et al. 2016). Health is built by empowering individuals and communities to increase control over their social, environmental and biological determinants of health thereby promoting their capacity to live active and productive lives (Randolph et al. 2007). Well-rounded decision-making and smarter, better multi-solving interventions benefit from inclusion of contextual information derived from multisectoral learning and practices. Working across sectors is, therefore, crucial to effective health practices (Armstrong et al. 2006). There has been a boon in recent publications calling for systemic change to promote One Health and for program evaluations to better understand what One Health projects work, how they work, where they work and for whom (ex. Lee and Brumme 2013; Häsler et al. 2014; Baum et al. 2017; Khan et al. 2018).

### Investment opportunity 9

- The tools to measure and maximize success.
- *To find generalizable lessons across species, places and problems.*

### Investment opportunity 10

- The conceptual foundations of One Health, diverse teams and implementation science capacity.
- *To move from a discovery science to an action science agenda.*

## II Turning the case for change into action

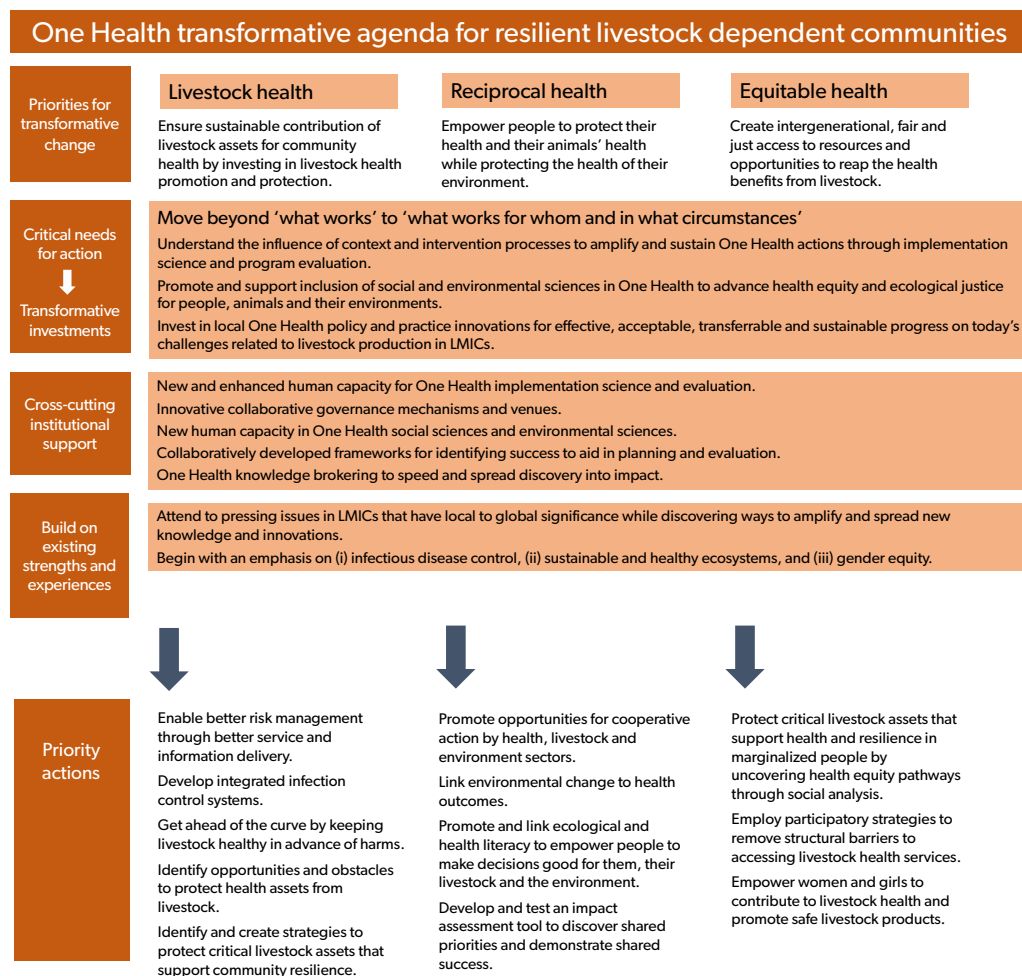
### 8 The theory of change

The central theme of the case for change outlined above is that to effectively implement a transformative One Health agenda for livestock dependent communities, more rapid and effective diffusion of innovation is needed. This requires a focus not only on what must change, but also on ensuring that change can be equitable and sustainable. The way in which this can be achieved is presented in our theory of change (Figure 3). Combining this theory of change with the priorities for transformation highlighted in Section 4 above leads to a strategy for investment and action targets (Figure 4). This section of the reports elaborates on this strategy.

Figure 3. A theory of change for a transformative One Health agenda for livestock dependent communities.



Figure 4 – Implementation strategy for a transformative One Health agenda for livestock dependent communities.



## 9 Strategies to get from where we are to where we need to be

Bridging where we are now with where we need to be requires cross-cutting institutional support and investment in transformative ideas, people, processes and partnerships to adapt and mobilize local innovations for resilience and health from the local to global scale.

Knowledge about new threats and risk factors alone will not lead to risk reduction without understanding the factors that can change the trajectory of a socioecological system to a safer state. Understanding the processes through which One Health interventions are effective in livestock dependent communities, and how to spread and sustain effective interventions between locations and over time, will speed the diffusion of innovation and amplify the impact of investments. New local, national and global capacities are needed that can be deployed across problems and places to accelerate One Health knowledge into action.

To realize the growing expectations for One Health among researchers and decision makers working with livestock dependent communities, a wider and more diverse set of skills, knowledge and perspectives is needed among all stakeholders. This requires not only greater investment in conventional frontline services, such as diagnostic labs and integrated health service delivery, but also in cross-cutting capacities and ideas that will make it easier to see what is working and for whom and to push those lessons to the global community more routinely and effectively.

Four questions guide a knowledge-to-action agenda to speed the translation of research and knowledge into positive health changes:

- How can we determine which interventions can be effectively integrated within real-world systems?
- How can we best assess the efficacy and effectiveness of an intervention in terms of health outcomes that are important to local, national and global communities of people and animals?
- What enables or impedes effective processes, policies and practices from being transferred across different communities and contexts?
- How do varying perspective on the necessary measures and assessment of success affect the ability to identify fair and effective One Health practices?

## 9.1 Cross-cutting institutional support

### 9.1.1 New and enhanced human capacity for One Health implementation science and evaluation

To move beyond what works to what works for whom requires narrowing the gaps between knowing and doing. One Health managers and researchers must assess, reinforce and amplify locally and internationally developed innovations and facilitate their diffusion and adoption to other settings.

#### Investment opportunity 11

- A diffuse network of centres of excellence and highly skilled people at local to international levels.
- *To find out how to identify, adapt and disseminate lessons learned from research and experience.*

#### Investment opportunity 12

- New capacity in One Health knowledge translation, knowledge brokering and implementation science.
- *To speed and spread innovation.*

### 9.1.2 Innovative collaborative governance mechanisms and venues

One Health is predicated on collaboration across disciplines. This transformative agenda emphasizes additional collaborations with communities and decision makers. Participatory approaches to planning that account for intergenerational and interspecies health equity and sustainability of One Health innovations and interventions are essential.

#### Investment opportunity 13

- Sustained training, as well as venues and strategies to support training.
- *To maintain the relationships for One Health actions.*

#### Investment opportunity 14

- Innovative governance structures and convening mechanisms.
- *To empower local innovation.*



### 9.1.3 New human capacity in social and environmental sciences

The strong biomedical foundations of One Health are a launching pad for a wider set of perspectives and skills that can find win-win-win solutions across sustainable development, health promotion and ecosystem conservation.

#### Investment opportunity 15

- Strategies and opportunities that enhance and sustain involvement of social sciences and environmental sciences in One Health.
- *To maximize the potential for fair and equitable impacts.*

### 9.1.4 Collaboratively developed frameworks for identifying successes to aid in planning and evaluation

Early recognition of potential trade-offs will help guide planning and policy development and implementation and establish a process for evaluation.

#### Investment opportunity 16

- New tools and methods to identify indicators of success.
- *To account for trade-offs between the health of different species, sectors and values over time and across diverse landscapes and communities.*

### 9.1.5 One Health knowledge brokering to speed and spread discovery into impact

New and innovative One Health programs, policies and practices have been implemented in different contexts and to achieve different health goals. Guidance on how to create and implement win-win-win programs and policies can help accelerate change.

#### Investment opportunity 17

- Knowledge brokering capacity.
- *To leverage lessons learned and improve diffusion of innovation by sharing and validating best practices in One Health.*

## 9.2 Building on existing strengths and experiences

### 9.2.1 Attend to pressing issues in LMICs that have local to global significance while discovering ways to amplify and spread new knowledge and innovation

One Health needs to reimagine how health is protected. Human, livestock and ecosystem health and resilience need to be built by design and in partnership with those who can influence locally adaptable policies and practices. This requires us to close the knowing-to-doing gap by systematically understanding which One Health actions and interventions are feasible, acceptable, impactful, equitable and sustainable within which social and environmental contexts.

## 9.2.2 Begin with an emphasis on (i) infectious disease control, (ii) sustainable and healthy environments, and (iii) gender equity.

Future health challenges will be complex and full of unknowns. There is no single path to realizing the value of a One Health approach in these conditions (Okello et al. 2011). This transformative One Health agenda provides a framework for progress towards the goal of healthy and resilient livestock systems for healthy and resilient communities and ecosystems by learning from the outcomes of operational programs. Three priority action goals are described below. They align with this agenda's three priorities for transformative change (see Section 4), as well as the seven priority areas of [ILRI's Livestock pathways to 2030: One Health](#) to generate 12 targets for action and investment.

# 10 Priority action 1: Livestock health as the pathway to controlling infectious diseases

*Empowering communities to protect and promote livestock health and welfare can improve livelihoods and build resilience to emerging hazards while addressing persistent infectious disease threats. A hazard-by-hazard approach to risk management is insufficient to ensure preparedness when the next threat cannot reliably be predicted, and existing threats are persistent and compounding. While Anthropocene threats vary in source and type, they often challenge communities in similar ways. Promoting livestock health and welfare is a multi-solving solution that provides the health resources to cope with and bounce back from infectious disease threats.*

## 10.1 Rationale

### 10.1.1 Keeping animals healthy reduces multiple infectious disease risks

Healthy livestock are more resilient to the effects of endemic disease and carry and transmit fewer pathogens affecting people and animals (ex. Perry et al. 2013; Grace 2019). This results in fewer opportunities for disease spillover into people or wildlife and less need for farmers to use antimicrobials, thus preserving treatment options for the future. Keeping livestock healthy reduces pathogen and contaminant loads in foods of animal origin and into the environment (ex. Patterson et al. 2020).

### 10.1.2 Building healthy circumstances for livestock

Animal health and welfare is about more than animal husbandry and disease control. It is also about ensuring the compatibility of the animal's environments with its innate adaptations (Fraser et al. 2013). Whereas understanding the causes and impacts of diseases can be accomplished by disciplinary experts, building healthy livestock systems is a multifaceted undertaking requiring investment in transdisciplinary teams that can foster the social and environmental conditions conducive to keeping livestock healthy (De Goede et al. 2013).

### 10.1.3 Persistent and priority infectious disease threats

- **Emerging infectious diseases:** In the shadow of COVID-19, it is widely understood that animals are the source of most new infectious diseases affecting people. 'Things that have never happened before, happen all the time,' (Sagan 1993) but emerging diseases remain hard to predict and usually come as a surprise. Efforts to inventory pathogens in different animal hosts and ecosystems to predict the next pandemic have not proven successful. While necessary and important, better surveillance and diagnostic capacity are insufficient to change the conditions that allow new diseases to emerge and spread (ex. Spencer et al. 2019). A comprehensive strategy to enable communities and ecosystems to cope with and recover from health threats must accompany ongoing attempts to predict and avert the next pandemic.

- **Endemic livestock diseases:** Neglected tropical diseases are poorly understood and recognized in both people and livestock yet they can cause significant animal diseases and create barriers to the benefits people derive from livestock (Grace et al. 2012). These diseases are often misdiagnosed and thus treatment and prevention are mismanaged (Halliday et al. 2015). There are known tools to break the cycle of infection such as vaccination, test and slaughter, disease treatment and vector control (Grace 2019). There is an ongoing need to understand how to adopt what we know works to different social, political and ecological settings.
- **AMR:** AMR is a growing global threat to the effective prevention and treatment of an ever-increasing range of bacteria, parasites, viruses and fungi. Few programs have been able to demonstrate success in reducing antimicrobial use (AMU) in livestock with associated benefits to animal or human health. This challenge to prove effectiveness highlights the multitude of drivers influencing AMR and AMU arising from the complex relationships between livestock production, food security, producer profitability and human and animal health (ex. Rushton 2015; Gilbert et al. 2021). It highlights the need for a new approach.
- **Food safety:** Growing international demand for animal source foods is leading to intensification of livestock production, increasing stress on individual animals and an associated increase in the number of disease outbreaks (ex. Patterson et al. 2020). Milk, meat and eggs present rich sources of nutrients. They are also media for transmission of infectious pathogens. Small-scale producers and their livestock living in poor-quality environments are more vulnerable to negative health impacts of infectious diseases (Perry et al. 2013). Fighting food safety risks at source not only protects farm families but also the consumers to whom they sell their food.

## 10.2 Investment opportunities and action targets

### 10.2.1 Enable better risk management through better service and information delivery

Greater diagnostic capacity and enhanced data sharing between animal and human health sectors can help prioritize (known) diseases, improve burden of illness estimates and enhance surveillance (Belay et al. 2017).

#### Investment opportunity 18

- Diagnostic capacity and enhanced data sharing between human and animal health sectors.
- *Better data and knowledge about disease in a local area contributes to better resource allocation for improved access to care and treatment, especially in the most marginalized communities.*

#### Investment opportunity 19

- Viable, sustainable and transportable models for animal health surveillance and services.
- *Developing and validating such models underpins all attempts to strategically combat emerging and endemic infections, food safety risks and AMR.*

#### Investment opportunity 20

- Livestock health literacy programs.
- *To help farmers and institutions find, understand and use information and services which inform health-related decisions and actions for themselves and others.*

#### Investment opportunity 21

- All-of-government policy inventories and evaluations.
- *To identify opportunities for cross-sectoral health protection and promotion on a place and settings basis, building on existing policy strengths.*

### 10.2.2 Develop integrated infection control systems

Infection control investment has historically favoured drugs and vaccines, but how animals are raised is a central driver of infectious disease, AMR and food safety threats. Research has often identified a problem (e.g. poor hygiene, detection of pathogens, lack of knowledge of foodborne disease risks) but has not successfully resolved these problems (Vipham et al. 2020). Livestock produced on farms with ineffective biosecurity and hygiene practices are more likely to produce harmful animal-sourced foods or be afflicted by infectious disease (ex. Garcia et al. 2021; Arens et al. 2015). Growing recognition of how animal health contributes to better food safety and environmental health has highlighted the need for better infrastructure throughout food supply chains, better sanitation and hygiene practices, and infrastructure to reduce environmental contamination (Jaffee et al. 2020). The growing complexity of food production systems has resulted in growing numbers of individuals and organizations, each having different roles and responsibilities (Kang'ethe et al. 2020). The mixed jurisdictions and rapidly changing systems present regulatory challenges. This has led to calls for better capacity to identify threats in advance of harms rather than focusing on implementing new or tougher regulations that are already difficult to enforce. Investments are needed to promote integrated infection control programs and practices that are adaptable to the wide variety of livestock rearing circumstances.

#### Investment opportunity 22

- Integrated approaches to infection control.
- *To explore: (i) how systems need to change to support integrated and comprehensive infection control; (ii) the education and training needs of people who can create conditions unfavourable to infectious diseases; (iii) monitoring and feedback to show what works and for who; and (iv) demonstrable support to shift to a culture of herd health rather than disease detection and response alone.*

### 10.2.3 Get ahead by keeping livestock healthy in advance of harms

One Health needs to support health early rather than only control disease later. Empowering communities to protect and promote animal welfare and health can improve livelihoods and contribute to food security while decreasing the likelihood and impact of infectious diseases (Njisane et al. 2020). A multifactorial approach to health promotion can help make explicit some of the external drivers of health which could in turn help to identify a wider suite of stakeholders, interventions and policy options to prevent harm before they arise (Wittrock et al. 2019).

#### Investment opportunity 23

- Collaborative processes and participatory research in livestock health promotion.
- *To identify and operationalize strategies which move from a disease focused agenda to a health agenda that monitors and manages the individual, social and ecological determinants of livestock health.*

### 10.2.4 Identify opportunities and obstacles to protecting health assets from livestock

Keeping livestock healthy helps prevent emergence and spread of infectious disease, reduces the need for AMU and protects food safety. Turning this general statement into local change requires knowledge-to-action plans and programs.

#### Investment opportunity 24

- New participatory methods for livestock health promotion.
- *To learn from the past and identify opportunities and overcome barriers to keeping livestock healthy and ensure the fair distribution of the health benefits such systems provide.*



### 10.2.5 Identify and create strategies to protect critical livestock assets that support community resilience.

It is easier to know that something must be done than it is to effectively get it done. Processes for moving knowledge into action must be strategically and cooperatively planned by knowledge users and knowledge producers as must criteria used to deem a project successful.

#### Investment opportunity 25

- New tools to 'show what works'.
- *To comprehensively document the impacts of programs, policies and processes on disease dynamics, food safety and community well-being.*

## Building on success–1

### Controlling endemic zoonoses benefits from a multi-pronged approach

Brucellosis is a major zoonotic pathogen that is endemic in many parts of the world. In 2018, Buttigieg et al. evaluated and compared brucellosis control programs in Malta and Serbia. In Malta, a multisector outbreak committee led by public health with cooperation and support of animal health, agriculture and law enforcement used a multi-pronged approach to control and eventually eradicate the disease. Their efforts focused on identifying human cases, engaging the public through a mass education campaign to increase awareness, organizing talks with farmers and herders about hygiene and pasteurization, the development and enforcement of new regulations for processing, labelling, transporting and selling cheese, and testing and slaughtering livestock. Together, and with modifications as gaps were identified in the approach, these coordinated actions resulted in Malta eradicating human brucellosis in 2005 and bovine brucellosis in 2016.

***This case study and evaluation shows the importance of learning from experience and building a knowledge base of what works, for whom and in what circumstances.***

*'One Health initiatives should be applied at the right place, at the right time, with the right people and using the appropriate conditions/infrastructure' (Buttigieg et al. 2018).*

## 11 Priority action 2: Reciprocal health—a circle of care

*Health and environmental issues are becoming increasingly complex, cross-cutting and inter-related. Gathering multiple sectors and perspectives together to advance shared health and environment goals will support improved health, equity and environmental sustainability.*

## 11.1 Rationale

### 11.1.1 Human health, livestock health and environmental health cannot be separated

Healthy ecosystems provide local resilience and support livelihoods in times of crisis and environmental stress (Gordon and Enfors 2008). Healthy livestock support resilient communities who care for and sustain local ecosystems. Human activities interfering with ecological systems and the processes of the natural world have significant implications for animal health and welfare (Fraser and MacRae 2011), which in turn constrain the contributions they make to human health. Livestock production depends on ecosystem services that provide food, recycle nutrients, regulate microclimates and local hydrology, suppress undesirable organisms and detoxify noxious chemicals. These in turn further sustain healthy livestock and the circle of care reinforces itself.

The relationship between livestock and ecosystems is not universally positive or negative and varies considerably between places and socioecological contexts (Nicholson et al. 2001). Livestock provide many benefits to society, but at the same time generate considerable pressure on land, water, climate, wild plants and wild animals. The negative environmental impacts of intensive livestock rearing are increasingly being exposed, with strong calls to reduce animal product consumption. However, for millions of people, including most of the world's most vulnerable people, livestock are an essential source of nutrients and calories. Recognising and understanding the environmental, economic and social trade-offs of One Health interventions is imperative to ensure livestock production can be safe and in accordance with the United Nations' Sustainable Development Goals (SDGs) (Salmon et al. 2018). Preventing environmental impacts through a 'without livestock' strategy is not likely to be feasible or desirable in the foreseeable future (Nicholson et al. 2001). Therefore, locally adaptable innovations are needed to promote reciprocal care of people, livestock and ecosystems.

### 11.1.2 Bridging a critical chasm

The actions we take today have enormous health and environment implications for future generations (Weiss 2010). One Health proclaims to serve the triad of human health, animal health and the environment, but the environment is often neglected (Essack 2018). Similarly, frameworks that integrate health and sustainable development often preclude animals (Nunes et al. 2016). Augmenting the environmental pillar of One Health teams, programs and policies could bridge these gaps. Environmentally augmented One Health would benefit the health sectors by protecting health assets such as air, water and food while avoiding threats from ecosystem change and helping the environment sector by grounding environmental improvements in health concerns relevant to people in their everyday lives (McGranahan et al. 1999).

## 11.2 Investment opportunities and action targets

### 11.2.1 Promote opportunities for cooperative actions by the health, livestock and environment sectors.

Successful collaborations are predicated on having a shared goal on which to work (Anholt et al. 2012). In the coming decades, we are likely to see more emphasis on indirect health effects and on global health problems with multidimensional components involving many sources and pathways (von Schirnding 1997). At the heart of this issue is the need to shift to integrated rather than sector-based approaches to achieve multiple objectives and to mainstream concepts of equity and redistribution of the health resources which environments provide for people and animals in this and subsequent generations (von Schirnding 2002; Stärk 2015; Bell et al. 2019).

### Investment opportunity 26

- Opportunity analysis across the livestock, health and environment sectors and at local, national and international levels.
- *To find win-win-wins and incentivize collaborative action for human, livestock and ecosystem health and sustainability.*

## 11.2.2 Link environmental change to health outcomes

Trade-offs between livestock production and environmental protection will increase significantly in the future of increased demand for livestock products (Herrero et al. 2009). How we communicate a threat influences attitudes, intentions and behaviours (Dickinson et al. 2013; Pope et al. 2018). The historic approach for promoting pro-environmental behaviour has focused on highlighting the benefits to others or to nature rather than appealing to self-interest (De Dominicis et al. 2017). Framing environmental impacts as health issues can increase the level of self-determined motivation of people to act in a pro-environmental way (Pelletier and Sharp 2008; Myers et al. 2012; Mir et al. 2016).

### Investment opportunity 27

- Create space for social and environmental sciences in One Health.
- *To advance health equity and ecological justice for people, livestock and ecosystems.*

## 11.2.3 Promote and link health and ecological literacy to empower people to make good health decisions for themselves, their livestock and the environment

Programs to promote and combine health literacy and ecological literacy can help people from the local level to international institutions connect the health, environment and sustainable development agendas and thereby further increase motivations to protect environmental assets.

### Investment opportunity 28

- Integrated livestock health and ecosystem health literacy programs that help farmers, industry groups, environmental protection agencies and communities find, understand and use information and services.
- *To inform cross-sector health-related decisions and actions.*

## 11.2.4 Develop and test an impact assessment tool to discover shared priorities and demonstrate success

There is a growing need for new policies and practices with potential to improve environmental sustainability, health and equity at the same time (Bell et al. 2019). To do this will require bringing together different sectors around common environmental issues to find win-win-win solutions that benefit people, animals and ecosystems.

### Investment opportunity 29

- Innovative One Health impact assessment tools that integrate health, social, environmental and cumulative impacts of livestock development and One Health management options.
- *The policies of all sectors that affect livestock health directly or indirectly need to be analysed and aligned to maximize opportunities for cross-sector health promotion and protection.*

## Building on success–2

### Factors influencing mitigation of risk of waterborne disease in Vietnam among small-scale integrated livestock farmers

Integrated livestock, crops and fish small-scale agriculture has been important in Vietnam for many centuries. For small-scale farmers, the transmission of water-related diseases due to poor farm management and lack of access to services has been a major constraint to reducing zoonotic disease risk. A survey of 300 farms in north and south Vietnam found that farmers were more likely to mitigate against waterborne disease if they expressed concern that they are more susceptible than average to avian influenza from well water, a female family member was the primary health decision maker, recognized cost of health care as a barrier to health interventions and follow the advice of health care workers. ***This study shows the relationship between linking an environmental threat with a health outcome and the likelihood of preventive steps taken by the farmer.***

Source: Hall et al. (2018).

## 12 Priority action 3: Equitable health

*To be successful, One Health needs a strategic and transformational health equity agenda. Health equity is created when people, livestock and ecosystems have a fair opportunity to reach their fullest health potential. Health equity begins by understanding how health issues affect population groups, species and places differently. Health equity needs gender equity.*

### 12.1 Rationale

#### 12.1.1 Livestock health enhances community resilience, alleviates poverty and addresses inequities

Livestock can produce a pathway towards health equity by securing current and future assets, facilitating greater participation of the poor in livestock-related markets and sustaining and improving the productivity of agricultural systems that produce health benefits for people, livestock and the environment (Kristjanson et al. 2010). Sustainable food production can improve health through increased self-esteem and empowerment in formerly marginalized groups; increase the status of women; support better maternal and child health and nutrition; and improve local employment and reversed migration (Pretty and Hine 2001). Inequity can influence infectious disease risk, particularly for marginalized groups (MacGregor and Waldman 2017).



### 12.1.2 Progress towards gender equity

Women are highly involved in agriculture, but their contribution tends to be undervalued and under-seen (Beuchelt 2016). Misunderstanding the experiences of different groups of people can negatively impact the overall effectiveness of the response. Women can own livestock more easily than other assets, and accumulate and sell them in time of need as an alternative to formal financial systems that rarely reach women. Women without access to other income-generating opportunities can derive daily food and income to sustain their families through livestock. Gendered roles in both animal care and the harvesting and processing of animal products create different exposures to pathogens, different opportunities to reduce disease risks and different access to livestock benefits (FAO 2011; Cunningham et al. 2017; Coyle et al. 2020; Oruganti et al. 2020). The different gender roles in the care and use of livestock influence the differential burden of additional responsibilities when livestock health management interventions are launched (Tangka et al. 2000).

It is essential to avoid unintended consequences on gender relations when trying to intervene at the human-animal-environment interface. It is important to purposefully appreciate gendered needs and preferences and support the empowerment of women and girls. Without understanding how inequities impact women and girls, we miss opportunities to progress towards gender equality, increase the productivity and welfare of livestock and protect households.

## 12.2 Investment opportunities and action targets

### 12.2.1 Protect critical livestock assets that support health and resilience in marginalized people by uncovering health equity pathways through social analysis

One Health has favoured a predictive approach to disease transmission over analysis of the social dimensions of human–non-human relations affecting health and equity (Brown and Nading 2019). Inaccurate statistics on participation of women and girls in livestock agriculture can underestimate the magnitude and importance of women’s work in this sector (Ahmad 2013) and underestimate One Health interventions impacts on women and girls.

Research and programs explicitly examining the intersection of gender, marginalization and One Health are strikingly limited and critically needed (Friedson-Ridenour et al. 2019). Enabling social analysis in One Health (through investment in human capacity development) can uncover different pathways for interventions linked to different visions for development and equity (Craddock and Hinchliffe 2015).

#### Investment opportunity 30

- Research, programs and capacity development for One Health social analysis.
- *To uncover different pathways for interventions linked to different visions for development and equity.*

### 12.2.2 Participatory strategies to remove structural barriers to accessing livestock health services

To ‘leave no one behind’, as promised in the United Nations’ 2030 Agenda for Sustainable Development, demands more than addressing the lack of inclusion. It requires more secure and dignified livelihoods, not more inclusion into systems of discrimination (George et al. 2020). Without understanding how resources, infrastructure and policies impact the capacity for women and girls to function as the ‘shock absorbers’ for families and communities through their responsibilities in caring for livestock and people, One Health interventions risks missing opportunities to increase the

productivity and welfare of livestock and protect households from livestock associated risks. They also risk unintended consequences if they fail to understand how gender disadvantages affect exposure to risks and access to benefits affecting women's and girl's health. Structural determinants, such as socio-economic and political processes that structure and stratify societies based on class, occupational status, education or gender, shape the environments that facilitate or impede people's ability to protect themselves or their animals from illness and, if sick, their access to quality care.

### Investment opportunity 31

- Inclusive and participatory investigation of structural barriers and the strategies to overcome them.
- *To ensure no one is left behind in One Health interventions.*

## 12.2.3 Empower women and girls to contribute to livestock health and promote safe livestock products

Household health security and gender are important social factors affecting prevention and control of animal diseases but are a neglected area of study and policy (Eba et al. 2020). Systemic barriers can prevent women from accessing the technical knowledge, resources or decision-making ability to influence animal health and productivity (Dumas et al. 2018; FAO 2019).

### Investment opportunity 32

- Resources to understand and ensure that women and girls also benefit from access, affordability and availability of health services generated by One Health interventions.
- *To increase women's and girls' capacity, confidence and power to make decisions affecting livestock health and its contributions to family wellness.*

## Building on success—3

### Controlling animal disease alleviates poverty and contributes to SDGs

In 2016, Marsh et al. explored the health, economic and social impacts of vaccinating cattle to control East Coast fever (ECF). ECF does not infect humans but does result in death and disease in livestock thereby affecting production and health assets from livestock. The team was able to demonstrate that vaccination reduced disease, reduced need to treat disease and increased livestock productivity. Through reduced livestock disease and higher milk production, disposable household income to be used for food, health care and education increased. ***This example highlights vaccination as a multi-solving solution to increase animal health, environmental health and equity and demonstrates the importance of building social science partnerships and capacity in One Health.*** Application of a social and participatory lens to a traditional animal health action (livestock vaccination), identified critical One Health interdependencies that may not have been recognized before.

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# Appendix 1: References used to identify shared attributes of successful One Health projects

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