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## Women smallholder farmers' engagement in the vaccine chain in Sembabule District, Uganda: Barriers and Opportunities

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### ABSTRACT

This paper explores women smallholder livestock farmers' barriers to effective participation in the livestock vaccine value chain (LVVC) and strategies for optimising the use of vaccines against poultry (Newcastle disease), and goat diseases (Peste des Petits Ruminants) in Sembabule District, Uganda. Using the three domains of empowerment theory: intrinsic, instrumental, and collective agency combined with USAID's gender analysis framework, we found that limited control over resources, and inadequate gender responsive policies hinder women's participation. Self-help groups increased opportunity for livestock ownership, autonomy, and decision-making. Engagement of women in the LVVC, is an entry point for improved vaccine accessibility, and agency.

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### KEYWORDS

Gender; barriers; opportunities; livestock vaccine value chain; Newcastle Disease; Peste des Petits Ruminants

### Introduction

Livestock play a critical role in the livelihoods of more than 900 million people in sub-Saharan Africa and South Asia (FAO 2018). Improved understanding of the role of livestock within rural households, with an emphasis on intra-household gender dynamics, will improve outcomes of development interventions (Quisumbing et al. 2015). In Uganda, women comprise 70–80% of the agricultural workforce, yet at least a third of the women live in absolute poverty (Uganda Bureau of Statistics 2016). Many organisations are prioritising the smallholder farmers (SHFs) in rural areas, especially women SHFs, assuming that animal health interventions such as vaccination would provide benefits and empower them (O'Sullivan 2017). Furthermore, farmer groups in sub-Saharan Africa are considered important vehicles for rural development, promotion of agricultural productivity, and improved economic growth of communities, especially women (Kimaiyo et al. 2017).

At the household level, livestock are a form of wealth storage, accounting for 20% of the productive assets (Lubungu and Mofya-Mukuka 2012). Livestock production contributes to income generation, and features prominently in cultural transactions such as dowry exchanges, settlement of disputes, as well as payment of school fees. Livestock provides nutritious diets and is a buffer against crop failure (Bagnol 2009). Ownership of larger animals often depends on land ownership and is a diversification strategy for resource-poor farmers. Generally, men and women own different animal species (Kristjanson et al. 2010). Cattle are mostly owned by men, while smaller livestock (poultry, goats, sheep) are preferred by women because they can raise them without formally owning land (Taruvunga et al. 2022; Njuki and Sanginga 2013; Kristjanson et al. 2010). Land is the most important asset in rural Uganda. Land rights and ownership are embedded deeply in

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patriarchal social norms and customary law, including those related to marriage and inheritance, which is to say that women's access to land is through their male kin (Doss and Meinzen-Dick 2015). Uganda has taken steps toward improving women's formal property rights, giving men and women the same legal land rights (Rugadya, Obaikol, and Kamusiime 2004), but enforcement of these laws is difficult. Uganda has partnered with UN Women to support the Government of Uganda in implementing global gender norms and standards, through enactment of the 2007 National Gender Policy.

Because men traditionally own and control land in Uganda, it is often easier for women to acquire small livestock instead (Rubin, Tezera, and Caldwell 2010). Interventions that increase women's access and rights to livestock, and then safeguard the women from dispossession, or their stock from theft or untimely death, due to diseases, such as accessibility to vaccines, could therefore help women move out of poverty (Bagnol 2009). However, women's limited control and decision-making reduces potential benefits (Doss and Meinzen-Dick 2015).

Livestock diseases are a major barrier to productivity. In Uganda, diseases like Peste des Petits Ruminants (PPR) and Newcastle disease (ND) are costing millions of dollars in lost revenue, even though they are vaccine preventable. For PPR, currently, there is a regional strategy; the Pan African strategy for the control and eradication of PPR reflects the Global Strategy endorsed by 45 African countries, and most countries have developed national strategies for the control and eradication of PPR (Britton, Caron, and Bedane 2019). The annual cost of PPR associated goat and sheep deaths is estimated between 794 and 2.7 billion US dollars (Jones et al. 2016). ND has long been recognised as a frontline viral disease that constrains poultry production throughout Africa, where the greater population of poultry is reared under traditional and conventional husbandry methods. This hampers the ability of management practices to be correctly embraced in limiting or excluding viral pathogens in the poultry production chain (Amoia et al. 2021). Live bird markets are key epidemiologic points for the spread of ND, and even though vaccines are available, outbreaks continue to occur (Britton, Caron, and Bedane 2019). Women's access to vaccines and information and training in modern livestock disease management is indirect, and mostly through men, lowering their involvement and efficiency (Maziya, Chiumbu, and Gumede 2019). This is mainly because women's role in livestock production is not valued as much, and the assumption is made that information provided to men as heads of households will eventually trickle down to women. In most settings, livestock extension officers are few and lack the capacity to reach most of the farmers in their community. Women also lack access to livestock services and product delivery systems, which are male dominated (Njuki and Sanginga 2013). Although most rural women have limited ability to influence intra-household decision-making on use of family finances, animal health, and vaccination, when they do, there is a positive impact on the overall household well-being of individuals, families, and rural communities, but also on overall economic productivity, given women's large presence in the agricultural workforce worldwide (Acosta et al. 2022).

Women manage livestock even when they are not the owners (Kristjanson et al. 2010). Most of the small livestock such as goats and chickens in Uganda, are kept near the home using free-range (extensive scavenging), or semi-intensive systems. The bulk of the labour of taking care of the small livestock is therefore provided by women. However, commercialisation schemes that depend on increasing women's labour contribution to livestock care without addressing their access to the cash generated, usually fail.

Women's empowerment is often the stated goal of development interventions and can be defined in varied ways. Kabeer (1999) defines empowerment as "a process by which those who have been denied the ability to make strategic life choices acquire the ability to do so". Empowerment is about changing gender relations, and positions of women so they can influence decision-making and policies to enhance their ability to shape their lives (Laven et al. 2009), although many development efforts assume that income generation is enough. The involvement of women in development projects at the grass root levels through direct decision-making power, and implementation activities, can be empowering because they earn respect through their own

efforts towards the development of their households and communities (Alkire et al. 2012). In relation to women and vaccine value chains (LVVC), empowerment is about changing gender relations, and positions of women horizontally and vertically in the LVVC and creating entry points for women so they can influence decision-making and policies, to enhance women's ability to shape their lives (Laven et al. 2009).

Interventions that challenge and change gender relations can enhance women's agency across the intrinsic, instrumental, and collective domains of empowerment (Malapit et al. 2019). This in turn can improve their position both horizontally as vaccine users, and vertically as vaccine distributors or deliverers, in the LVVC, while also contributing to increased livestock productivity.

Gender Transformative Approaches (GTAs) address both the fundamental causes and consequences of gender inequality and have been articulated conceptually since the 1990s (Kabeer 1999), but have faced a range of obstacles in their translation into applied programming. Some of the obstacles include development organisations' discomfort in engaging directly with unequal power relations, and gaps in gender analyses and integration capacities (Okali 2011). As such, gender inequalities persist in most development outcomes, regardless of the context.

This paper explores women smallholder livestock farmers' barriers to and opportunities for their effective participation in the LVVC and some strategies for optimising the use of vaccines against poultry (ND) and goat diseases (PPR) in Sembabule District, Uganda. It analyses these barriers and opportunities from an empowerment theory perspective, examining opportunities for the role of a GTA approach whose outcomes are more lasting while challenging the social context of gender inequity as well as enhancing resource access and control for women. These transform structural barriers, in particular, constraining norms that underpin gender equality. They go deeper than common gender integration and mainstreaming and tackle the root causes of gender inequalities instead of addressing its symptoms.

## **Methodology**

### ***Research area***

The research was conducted in Sembabule District of Uganda. The district has a population of 252,597: 50.2% males and 49.8% females (Ministry of Trade Industry & Cooperatives 2019). Sembabule District was purposively selected because it is predominantly livestock keeping, with a history of PPR outbreaks. It consists of two counties, Mawogola and Lwemiyaga: pastoral and mixed farming. In these two counties, six sub-counties were selected: Mateete, Lugusuru, and Mijwala in Mawogola, and Lwemiyiga, Ntutsi, and Bulongo in Lwemiyaga County.

### ***Empowerment theory and gender analysis framework***

Our methodology is rooted in Kabeer's (1999, 2005) framework of empowerment, which describes empowerment as a process of change on the interrelated dimensions of resources, agency, and achievements, and focuses on measuring agency, or the ability of individuals to make strategic choices, particularly in a context where this ability was previously denied. We characterise empowerment with three main domains: 1) intrinsic agency or "power within", 2) instrumental agency or "power to", and 3) collective agency or "power with" (Yount et al. 2019). 1) Intrinsic agency or "power within" is the process by which one develops a critical consciousness of one's own aspirations, capabilities, and rights. This, as reported by Malapit et al. (2019), can be assessed using autonomy in decision-making, self-efficacy, self-respect, an awareness of rights, and respect among household members. 2) Instrumental agency or "power to" is the ability to take strategic action to achieve one's self-defined goals, which can be assessed through input in overall productive agricultural and livestock decisions; ownership of land, livestock, and other assets; access to and input on decisions concerning credit; and control over use of income in the household. 3) Collective agency or

“power with” is the ability to be part of and/or mobilise people around common or shared concerns, usually captured through influences on systems, structures, institutions, and associations. Women’s empowerment is contingent on social transformation across these interrelated domains (Kabeer 2005).

We align the empowerment framework with the United States Agency for International Development’s (USAID’s) five domains of gender analysis framework (USAID Interagency Gender Working Group 2002) to create an analytical model against which we can generate specific research questions (Table 1). The five domains are 1) laws, policies, regulations, and institutional practices; 2) access to and control over assets and resources; 3) gender roles, responsibilities, and time use; 4) cultural norms and beliefs; and 5) patterns of power and decision-making, to create an analytical framework that focuses on identifying and analysing the barriers, opportunities, and strategies for improving women’s entry and participation in livestock ownership and livestock vaccine value chains. Key conceptual questions that we attempt to answer include:

- (1) What gender, social, cultural, political, economic, or technical barriers and perceptions impede women’s effective participation, define livestock ownership and decision-making, and prevent women from being beneficiaries of livestock vaccines as users and service providers?
- (2) What entry-points, factors, and opportunities are needed or exist to enhance women’s participation in the LVVC to increase livestock productivity and improve household food security?

Tools used in the field to carry out research (Table 2) included focus group discussions that included women only, men only, and mixed groups, key informant interviews, stakeholder engagement meetings, focus meals (impromptu gatherings around a meal), and jar voices. Jar voices are a methodological tool used to capture people’s opinions and ideas in transit. They are framed around simple questions written on charts/flip charts and hung on walls at points of purchase or congregation, such as agrovet or drug shops, feed mills, milk collection centres, or rural dispensaries. Participants are requested to answer these questions and place their answers in a jar. The answers are collected at the end of the day and replaced with a fresh set of questions the following day (Kyotos et al. 2022).

The sustainable livelihoods analysis tool (Murray and Ferguson 2001) was used to analyse the distribution of the five core assets or types of “capital” for community members: financial, social, human, personal, and physical. This is because we wanted to expand our recognition of assets beyond only financial resources, as sometimes seen in development policy and implementation. This tool is used to visualise the resources that people have. These can be different for men and women. Other tools used with the focus groups include the daily activity calendar, which is an activity to track men’s and women’s time use over a 24-h period; chart of gender roles, responsibilities, and time use related to livestock activities; gender stereotypes; and ranking exercises on perceptions of chicken and goat disease.

### **Data analysis**

Data analysis included daily reviews of all data to identify and triangulate key findings. Audio recordings were transcribed verbatim in the local language (Luganda and Lunyankole). Our country team members speak the local language and were trained in data transcription prior to the field work to ensure accuracy. These were then translated into English for coding and analysis. Inductive coding of FGD transcripts was compared and contrasted and a comprehensive code book of thematic codes was developed for further data summation and analysis. Content analysis was used to examine patterns and interpret meaning (Hsieh and Shannon 2005). Extracts and quotations were used as examples.

**Table 1.** Model demonstrating alignment of empowerment domains, gender analysis framework, and sample research questions.

Domain of empowerment	Framework of analysis based on USAID five domains of gender analysis	Some sample research questions around domain
<p>Intrinsic agency (power within) self-efficacy, self-respect, awareness of rights, autonomy in decision making</p>	<p>Patterns of power and decision making: Ability of people to decide, to influence, to control, and to enforce agency.</p> <p>Knowledge attitude and beliefs: Cultural norms, beliefs, stereotypes, systems that influence patterns of power and decision making.</p>	<p>Do women have the power to make decisions about what activities to engage in (entrepreneurship, vaccine distribution)?</p> <p>Do men and women value the use of vaccines differently in livestock health as opposed to other inputs?</p> <p>Do women actively participate in formal decision-making structures or bodies in the LVVC?</p> <p>Do women and men hold an equal number of decision-making positions in these entities (e.g. government extension, drug distributors, vaccine deliverers)?</p> <p>Do women have the power to make decisions about economic activities (what to purchase and sell)?</p> <p>Will women have control over and benefit from the funds and assets they may accrue if they participate in the LVVC?</p> <p>Do these stereotypes function as either facilitator or barrier for men and women in LVC engagement?</p> <p>Are there views about training or business engagement that could be considered in the community as roles for either women or men (e.g. only men can be trained to own agrovets or be extension workers)? If so, are these views barriers to women's engagement in the LVC?</p> <p>Do men's or women's self-perceptions, attitudes, or levels of self-confidence function as either facilitators or barriers to their engagement in the LVC?</p> <p>Do men and women have unequal education and/or knowledge in areas that are important for successful engagement (vaccine access, distribution)?</p> <p>Do men and women have equal access to resources related to vaccines (vaccines, deliverers, distributors, purchasing power, credit, training, information)?</p> <p>Do men and women have equal access to technologies and services that are relevant to being active in the vaccine value chain including training and other opportunities for skill development?</p> <p>Do women and men use what they own differently?</p> <p>What are men's and women's daily responsibilities in relation to livestock? How is time allocated and managed for men and women?</p> <p>If women have greater responsibility, are they able to participate in project activities?</p> <p>Where do they typically spend their day? Is it in places or locations that would make it difficult for them to participate in beneficial activities related to livestock</p>
<p>Instrumental agency (power to) input in overall productive decisions, ownership of land, livestock and other assets, access to and input on decisions concerning credit, control over use of income in the household, work-life balance, and ability to visit important locations outside home</p>	<p>Access to and control over assets and resources (including income, employment, and assets such as land).</p> <p>Gender roles, responsibilities, time use, and space.</p>	

*(Continued)*

**Table 1.** Continued.

Domain of empowerment	Framework of analysis based on USAID five domains of gender analysis	Some sample research questions around domain
Collective agency (power with) ability to be part of and/or mobilise people around common or shared concerns, and to influence the environment and allies	Laws, policies, regulations, and institutional practices.	<p>productivity and vaccines as deliverers, distributors, users?</p> <p>Do men and women have equal access to formal and informal networks that share information related to vaccine value chain and access?</p> <p>Are men and women likely to be owners of property that gives them access to collateral for a business loan or entrepreneurship or are they limited by customary law, religion, or even the laws of the land?</p> <p>Do they have equal rights to inheritance, to own land, to own livestock, to buy and sell or even to travel without their husbands' consent?</p> <p>Are the differences dependent on marital status of women?</p> <p>Are women and men treated equally in legislation related to the LVVC?</p> <p>Are there any special benefits or restrictions in the legal or regulatory framework that explicitly or indirectly target women or men?</p> <p>Do married women have more legal or societal protection than single women?</p>

**Table 2.** Tools used and sample size.

Tools used	N° of events	N° of participants			
		Male	Female	Male and female (Mix)	Total
Focus group chicken owners	10	42	84	0	126
Focus group goat owners	10	38	93	0	131
Key informant interviews	20	11	9	0	20
Focus meals	4	0	0	82	82
Jar voices	8	0	0	72	72
Stakeholder's meetings	2	0	0	42	42
Outcome mapping meeting	1	0	0	18	18

### Limitations

Even though both women and men were included in the study, the selection of participants was done by local leaders. This sometimes tends to exclude the most vulnerable of the community members. Using jar voices and focus meals allowed us to engage people who were not selected by their community leaders. The team did not analyse any previous successes or failures from other organisations that may have done similar work in the area. The study did not also specifically address women in the urban areas who keep small livestock. The focus was only in the rural and peri-urban communities. More research is needed to examine the urban setting.

### Results and discussion

The study results are organised into sections aligning sequentially with the three domains for empowerment and the gender analysis themes. [Table 3](#) gives an overview of the results flow.

**Table 3.** Presents alignment of results with empowerment domains.

Domain of empowerment	Gender analysis themes	Results themes
Intrinsic agency	Patterns of power, autonomy, and decision making	Role of self-help groups in women's accessibility to livestock products and vaccines and autonomy in decision making Gender norms and stereotypes and their influence on patterns of power and decision making
Instrumental agency	Access to resources and credit, input into productive resources, time use, and work balance	Women's access to land and how it impacts access to credit, livestock ownership, and livestock vaccination opportunities Men's and women's control over financial, physical, and personal assets Women's input in livestock productive decisions and time use
Collective agency	Laws, policies, regulations, and institutional practices that hinder or promote vaccine accessibility	Customary laws and practices that limit women smallholder farmers accessibility to resources Factors that influence vaccine accessibility and adoption for women smallholder farmers Laws and legislative framework governing livestock vaccine distribution and delivery

### 1. Women's self-help livestock groups increase women's accessibility to livestock products and vaccines and promote women's autonomy in decision-making

Women's empowerment is evaluated fundamentally in the framework of the family, household, and community (Kabeer 1999). In a patriarchal setting like Sembabule, power distribution within the household and community systematically favours men because of women's lower social status. However, women who belong to social groups, such as self-help groups (SHG), seem to hold greater autonomy, particularly in the control of economic decision-making. In Sembabule, women join livestock farmer SHGs where they feel they have more control over the ownership of livestock, as well as autonomy in decision-making and are using them as a safety net to protect against "men taking over". They state that men would not easily interfere with them: "*eza group omushija takwik-wataho*", translated as men would not easily sell/interfere with livestock that belongs to a group.

Njuki and Sanginga (2013) report that despite their role in livestock production, women's control has traditionally declined when productivity increases and products are marketed through organised groups such as cooperatives, whose membership is predominantly men. However, in Sembabule, the women who own animals through groups have less male interference. These SHGs provide credit and savings for purchase of vaccines in bulk, goats, and chickens. These animals are considered low revenue commodities, as opposed to cattle, and women maintain control over them. The groups function as a social support system, and women are also able to access livestock disease management training programs faster if they are within groups. In the informal economy, groups of women producers are better able than individuals to access information and services, to access resources more cheaply and easily, and are in a better negotiating position with potential vaccine suppliers and distributors.

Local SHG initiatives have contributed immensely towards increasing women's empowerment in Sembabule. The success stories of many gender responsive SHGs in African countries attest to how these are the preferred choice for collective organising among women (Kimaiyo et al. 2017). Even in Sembabule, where women are under-represented in leadership and decision-making, group membership is seen as empowering. Participation in SHGs provides an entry point for them to access livestock management and vaccine training, credit to purchase animals of their choice, independence in financial decision-making, solidarity, improved social networks, and respect from the household and other community members, which in turn results in improvements in women's bargaining power, autonomy, and self-confidence. Since power distribution within the household automatically



favours the male heads of households, and many times males have more access to credit, the notion of women having access to credit can still be viewed as a new phenomenon; therefore, credit offered to women could be interpreted as credit to the whole household. However, when women receive credit through SHGs, many times, this is considered a safe space for women to manage their resources, especially when it is a collective group controlled income (Alemu, Van Kempen, and Ruben 2018). Even though SHGs that have a strong economic component or engage in collective income generation are more transformative economically, they are also more challenging. There are instances where backlash within the family has been documented, as women become more economically independent since it challenges the intra-household dynamics, in particular, the relative bargaining power of husband and wife (Alesina, Brioschi, and Le Ferrara 2016; Luke and Munshi 2011). It is supposed that this “backlash” from men stems from the perceived threat that their head of household status will be eroded, which comes with the threat of reduced status and self-respect (Weitzman 2014). However, this is not the norm. The majority of the results point towards positive and significant impacts of SHG participation on empowerment of women at the community level (Alemu, Van Kempen, and Ruben 2018). This social capital generated through collective action is an important means by which women gain access to resources and economic opportunities to escape from poverty.

Many organisations spend significant resources facilitating savings and credit groups, with the belief that access to microfinance, training, and group support can enhance women’s empowerment. The SHG model is believed to be particularly appropriate for working towards women empowerment based on the idea that collective action is most effective in fighting patriarchy, and challenging power imbalances (Brody et al. 2017). Women’s collective agency through SHGs must be part of ongoing engagement with regulators and policymakers to create an enabling environment for gender responsive vaccine delivery systems. A more supportive environment for women smallholders requires political will. At our stakeholder engagement meetings, policy holders reviewed the laws, policies, and regulations for vaccine manufacture, importation, distribution, and delivery in the country from a gender perspective.

## 2 Entrenched gender norms, stereotypes, and systems influence patterns of power and decision-making and limit women’s participation as animal health service providers

Transforming traditional gender roles and promoting gender equality requires addressing discriminatory social norms and stereotypes. Social norms shape acceptable roles, opportunities, and behaviours for women and men in society and the household. Deeply entrenched gender stereotypes restrict men to breadwinning and view unpaid care work as a female prerequisite. These stereotyped systems influence patterns of power and decision-making, and affect women’s self-efficacy, awareness of their rights, autonomy in decision-making, and upward mobility. Gender and power exist at a societal and institutional level, which inevitably influences the personal relations, and rarely works in isolation. As described by Gumede Ntombizonke, Maziya, and Chiumbu 2019, decision-making for most of the female farmers is inexorably linked to the husband and the husbands’ family, as ultimately the decision to sell livestock needs permission from them.

In Sembabule, very few women occupy positions as animal health service providers (AHSP), veterinarians, and animal health officers. Approximately 90% of AHSP are men. There is an entrenched belief that one needs to have “strength” to be an AHSP and this is considered a male trait. Culturally, boys are given priority access to educational opportunities in Uganda. This discrimination against girls from accessing education increases their vulnerability to forced early marriages and leaving school. One participant (a male veterinarian) says, “there is stigmatisation against women in some fields which are taken to be for men; even some farmers have a perception that animal health service is a man’s job”. Another female participant claims “Even when women inherit land or

cattle from their father, a woman has to bring everything to the husband who is the household head, a woman has never been a household head”.

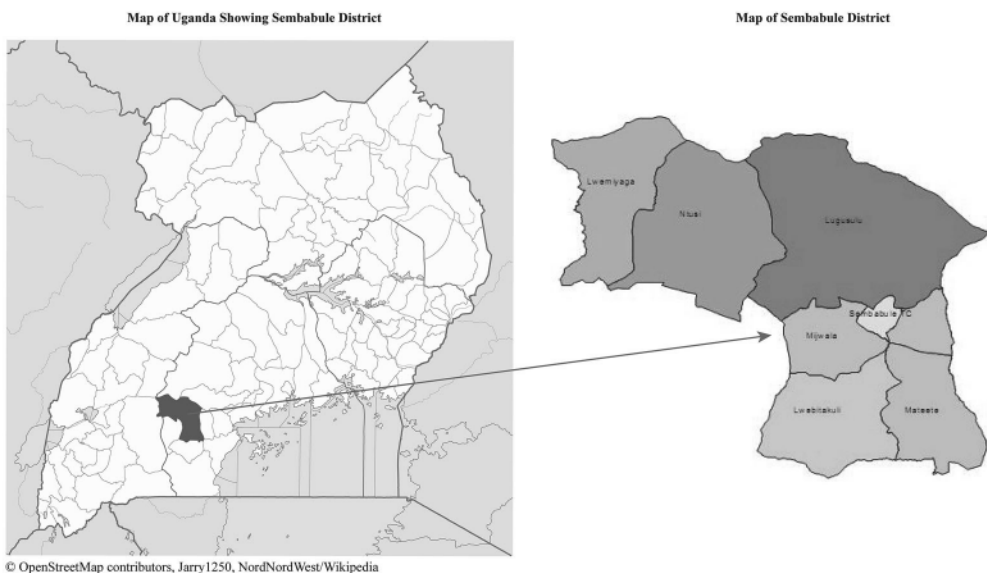
In most communities, domestic work is mainly performed by girls. This limits the time women have to study, leading to poor exam performance. Very few women end up in the Science, Technology, Engineering and Mathematics (STEM) fields, denying women an opportunity to pursue science related courses like animal health at a college level, affecting their earning capability and upward mobility. Despite the introduction of science policy in 2004 and the Universal Primary and Secondary Education Policies in 1997 and 2007, girls still drop out of school at a high rate and the number of girls studying sciences remains critically low (Odaga 2020).

Women face many gender-based barriers as AHSP, from weaker ties to both official and private service providers, resulting from a pervasive attitude that women’s contributions to livestock production and processing are unimportant, to gender-based stereotypes that undermine women trying to pursue careers in animal health. Traditional beliefs, cultures, and norms also undermine women’s confidence in their own abilities.

Within the community, women are stigmatised if they are seen riding motorbikes, which is the most common form of transportation, and therefore rely on being carried by men. Cultural denial of females from riding has made it difficult for the female AHSP to perform effectively, since it involves hiring someone to bring them to the field and increases the charges for farmers. Gender stereotypes are perpetuated across generations and deeply embedded in cultural norms. They shape self-perception and attitudes to relationships for women aspiring to work in animal health. Successful interventions depend on identifying strategies to transform social norms that prevent women from controlling resources or developing confidence in their own abilities.

### 3 Access to land resources can increase women’s ownership of livestock and access to credit resources

Enabling resources are the prerequisites for empowerment (Kabeer 1999). Definite human, social, and economic resources and environments can enhance women’s potential to exercise instrumental agency (Kishor 2000). If women have access to the same financial resources as males, their food



**Figure 1.** A map of Uganda and Sembabule District.

production can increase by up to 30%, potentially eliminating hunger for 150 million people (Howell 2016).

The majority of women in Sembabule District do not own or have access to land, and those who do cannot use it as a financial resource for credit or collateral for borrowing because the land parcels are too small, and located in rural areas, and many of the women do not have access to land titles. However, there are some steps that have been taken in Uganda towards improving women's formal property rights (Rugadya, Obaikol, and Kamusiime 2004). In Uganda, only 10–20% of landholders are women (UBOS 2016). Land rights tend to be held by men or kinship groups controlled by men, and many women have access mainly through a male relative, usually a father or husband. Even then, women are routinely obliged to hand over the proceeds of any farm sales to a male and have little say over how earnings are used. In some communities like Lugusulu, Kyera, and Ntusi, women indicated they have access to land for farming purposes but do not control the proceeds that come from it. Husbands can sell it anytime without consultation. *“Abashaija nibo bakutegyeka buri kimwe. Nibabasa kwija baguze eitaka bahereze abakyara babo pecenti eibiri zonka”* (in Lunyan-kole), translated as “men are in control of everything. Men come and sell land and women are only given 2%”, one woman said.

In Sembabule, livestock are a form of wealth storage where large animals are for men and small animals like goats and poultry are left for women and these are productive assets. This is in agreement with Lubungu and Mofya–Mukuka (2012) who reported that livestock contributed to 20% of the productive assets in Zambia.

In Kyera, women have small land sizes mostly for food production which restricts the number of goats they can own. Some men deny their wives access to land because they need it as grazing land for cattle, which are more valued than goats. *“Abashaija abamwe tibakutwiyiriza kurisiza embuzi nyingi ahitaka barikugyira ngu obunyansi nobwente”*, translated as “Some of our husbands deny us access to land complaining that the goats will eat their grass, which is for cattle”.

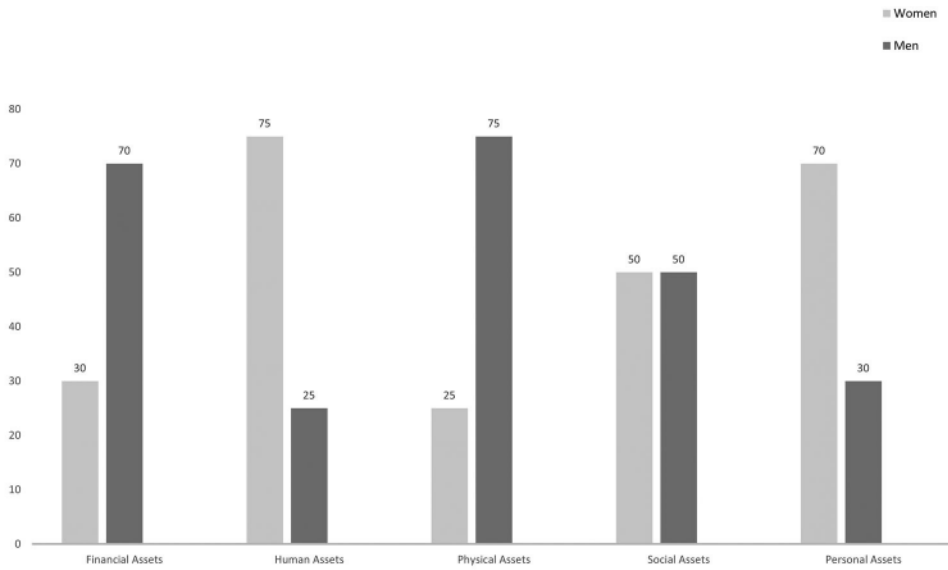
Gender-specific obstacles, such as lack of access to land and land rights, and inherent gender bias in the economic system are major roadblocks to women's access to credit for purchase of animals and livestock vaccine, putting female farmers at a disadvantage. In addition, entrenched gender roles prevent women from participating in income generating activities without their husbands' permission.

Although there are some efforts being made in securing women's land rights through titling, there are still challenges encountered by women that require multiple interventions including more gender equitable laws, capacity building, and training for women to ensure that they can reap benefits from the land.

#### 4 Men have greater control over financial and physical assets while women control human and personal assets

A Sustainable Livelihood Analysis Tool (SLAT) was used to analyse the distribution of the five core assets for community members. Figure 2 shows the assets distribution. The vertical axis reflects percentages of asset control up to a maximum of 100%.

Participants were asked to score men's and women's access to, and control over, each type of asset using a percentage scale with 100 as the maximum. All participants explained their reasons for the score, then negotiated a consensus on the most typical situation in the village. According to the graph, men had greater access to financial and physical assets while women controlled human and personal assets. This has been attributed to a limited ability by rural women to influence intra-household decision-making on the use of family finances (Njuki and Sanginga 2013). There was a fifty–fifty balance in the social assets' ownership. Social assets refer to networks and contacts through family support, friendships, and political participation that enhances support systems.



**Figure 2.** Graph showing assets distribution.

These results align with the rest of the data that show that control of financial resources and ownership of physical assets such as land and cattle are in the hands of men. Results indicate that many women in the community feel that they have self-capability and esteem, which exerts a strong influence on personal motivation. This may be related to women's participation in SHGs where they control resources and decision-making.

This livelihood analysis highlights the extent to which control over assets creates and perpetuates the vulnerability of individuals, and their position within the community. Control and ownership of different types of assets improve the lives of the women and men who own and control them. It is a measure of opportunities or outcomes and is also important to women's bargaining power and their economic empowerment. Closing the financial and physical asset gap is important for women's economic empowerment.

## 5 Women have significant but invisible roles in livestock-productive activities

Gender roles, responsibilities, time use related to livestock activities and work balance affect women's instrumental agency. Excessive workloads limit women's mobility and ability to do many things, including attending group meetings, freedom of movement outside the home, or earning income.

**Table 4.** Share of respondents participating in important livestock activities.

Activity	Men	Women	Chi-sq ( <i>p</i> -value)
Animal feeding	50.0%	83.7%	19.444 (<0.001)
Checking animal health	27.5%	77.0%	33.849 (<0.001)
Disease preventive measures	29.3%	84.1%	0.107 (0.744)
Milking animals	0.0%	46.2%	—
Cleaning animals	28.8%	89.8%	101.874 (<0.001)
Slaughtering animals	62.3%	32.0%	21.925 (<0.001)
Breeding	54.5%	46.6%	0.446 (0.504)
Marketing of live animals and products from live animals	62.8%	46.3%	3.460 (0.063)
Selecting which species and breeds to rear	61.9%	60.9%	0.007 (0.932)
Sharing livestock workload among household members ( <i>r</i> )	47.2%	91.7%	34.049 (<0.001)

Women in Sembabule provide most of the labour related to livestock (goats and chicken) management. A quantitative assessment study with 300 households in this same community to compare men's and women's participation in livestock production activities (Table 4) found that significantly more women than men participate in the daily animal chores such as animal feeding, checking animal health, cleaning animal houses, milking, disease prevention measures, and sharing livestock workload among household members. Men tend to participate in irregular once-in-a-while activities, such as breeding, slaughtering, and marketing, placing them in a position to control/distribute those resources.

From the daily activity calendar, women have an average workday of 14 h compared to men's 6 h. This activity calendar reveals that culture-specific gender roles and responsibilities influence the capacity of men and women to allocate labour time across reproductive and productive activities.

It is increasingly accepted that women play a large role in managing and caring for livestock even when they are not the owners, and this has made them the managers (Kristjanson et al. 2014). Even though women perform most of the daily activities in livestock production, their roles are only recently being recognised. However, the success of the livestock enterprise in Sembabule relies heavily on effective involvement of women.

The input and potential that women provide as productive agents should be recognised and reflected in policy formulation (Maziya, Chiumbu, and Gumede 2019). Women should have direct access to income-generating or decision-making power on product disposition especially in light of the global trends, and shift from subsistence-level of livestock keeping to market-oriented production in the context of the livestock revolution. There is need to recognise women's contributions to the livestock sector, not just informally, but also through formal systems. Women as livestock managers need multiple linkages to formal and professional sectors, especially training, supervision, access to resources such as vaccines, participation in decision-making, acknowledgement, and support, as well as LVVCs systems, linking them to vaccines, drugs, equipment, and skilled expertise.

## 6 Customary laws and practices do not align with national laws in promoting gender equity

A discussion on equal rights to inheritance, to own land, to own livestock, to buy and sell, or even to travel without their husbands' consent led to a discussion on the clashes between customary laws and national laws. Men are responsible for formulating and enforcing both the traditional and national laws, and women rarely participate. "*Timyanya yeitu kandi tihine orikubasa kutuhuri-kyiriza*", translated as "it is not our place, and no one will listen to us", one woman said. One community leader indicated that both men and women attend meetings to discuss policy matters, but the women said that quite often they sit at the back, and do not contribute. Many believe that existing laws and policies do not favour women, in agreement with Rugadya, Obaikol, and Kamusiime (2004), who reported that even where the laws exist that give women and men the same legal land right, it is difficult to enforce those laws because the enforcers are men. Some men participants indicated that the current national policies favour women and girls, such as the gender policy (); however, they are rarely enforced. For example, both men and women note that women can only access and benefit from property but cannot be heirs. A local saying; "*Okutura ku ntebe kitegegeza kukwata engabo ya tata ne fumu*", translated as "to sit on the father's chair or holding the father's spear is for men", is proof that the traditional laws are the laws of the land. This is in agreement with Rubin, Tezera, and Caldwell (2010), who reported that men traditionally own and control land in Uganda. Women continue to face severe legal and cultural obstacles to ownership of property, including land and inheritance, which has hindered their advancement and development.

## 7 Livestock vaccine inaccessibility is a barrier to livestock productivity and food security for women smallholder farmers

**Table 5.** Scoring and ranking of livestock problems (Kyera women goat and chicken keepers).

PROBLEMS/CHALLENGES BY SCORE AND RANKING		
PROBLEM	SCORE	RANK
Diseases	10	1
Lack of vaccines	7	2
Lack of ready markets	6	3
Poor quality breeds	4	4
Thieves	4	4
Commercial livestock feeds are far away	3	6
Expired food mix concentrates	3	6
Commercial livestock feeds are expensive	2	8
Contaminated commercial livestock feeds	2	8

Using ranking exercises, participants ranked the problems related to livestock keeping. Diseases were scored followed by lack of vaccines (Table 5). ND ranked the highest among the poultry diseases (Table 6).

Farmers' flocks are frequently decimated by ND despite availability of an effective ND vaccine and PPR, even though Uganda is part of a global PPR eradication campaign. Many farmers have lost their goats to PPR in the last three years. Women livestock keepers are aware of the importance of vaccination for their animals but feel that their small flocks are deliberately not targeted for vaccination by the private sector or government. "*Gavumenti negyema ente omumwanya ogu konka tihine oriku-tekateka aha mbuzi ne enkooko nobuzakufa omubwingyi*", translated as "the government massively vaccinates cattle in this area, but no one thinks about goats or chickens even though they die in larger numbers", one woman said. The women feel that there are gendered politics in livestock disease control systems that need to be transformed. Cattle are prioritised over small livestock and many resources are put towards protecting cattle. For example, in cases of Rift Valley Fever (RVF) outbreaks in Rwanda, cattle were preferentially vaccinated over goats, even though goats are known to succumb more often to RVF than cattle (Gannaway et al. 2022).

Major gaps in vaccine accessibility include lack of access to a vaccine cold chain, long distances to vaccination points, lack of refrigeration in agrovet shops, and unreliable electric power supply. This has led to inaccessible and poor-quality vaccines. These results align with studies done in South Africa, that show that farmers often have to travel long distances in order to buy vaccines and this has a negative impact on their effectiveness if the cold chain is broken. Some farmers do not know where they can purchase primary animal health care products and this has a rollback effect on the health of their livestock (Gumede Ntombizonke, Maziya, and Chiumbu 2019).

Some private AHSP charge high costs to smallholder farmers with fewer flocks. A study carried out in Kenya found that costs emerged as the greatest barrier to vaccine adoption. Cost becomes a critical determinant of vaccine uptake since in households where livestock vaccination costs are higher than available disposable income, farmers may forfeit vaccination or only have some of their animals vaccinated (Mutua et al. 2019)

Farmers claim PPR has been present in the Sembabule district of Uganda since 2016. Preliminary data indicates that female smallholder farmers are losing over 50% of their goats to PPR which is a

**Table 6.** Scoring and ranking of chicken diseases (Kyera women goat and chicken keepers).

DISEASES	SCORE OUT OF 10	RANKING
Kipumpuru (Newcastle disease-compatible)	8	1
Senyiga Ye Nkoko (Newcastle disease-compatible)	6	2
Blindness	5	3
Okudukana (diarrhea)	3	4
Gumboro	3	4
Oburoro (fleas)	3	4
Joint disease	2	7

notifiable disease. The official mechanism for acquisition of vaccines is through the government system, which has limited resources. However, due to dire circumstances on the ground, private and public veterinarians are illegally importing the PPR vaccine from Kenya. There are existing private vaccine manufacturers and big distributors that are willing to support vaccine delivery if regulatory barriers are minimised.

There is a need to break down regulatory barriers through engagement of the government and private sectors in Uganda, to design and test public–private partnerships for sustainable delivery of vaccines. Communication with sector leads in Uganda indicates an openness on their part to find a solution. Dialogue meetings with national and subnational policymakers to address issues such as licensing procedures, regulations, and rules for vaccine importation within the region, and distribution and sale of vaccines by the private sector, can increase vaccine accessibility for smallholder women farmers.

Engaging regulators and policymakers to examine regulatory mechanisms that can create gender sensitive vaccine delivery systems will create opportunities for effective and efficient vaccine distribution chains. This will intensify vaccine adoption through an improved enabling environment and increased vaccine accessibility and demand for women smallholder livestock farmers, and facilitate networking and collaboration between women smallholder farmers and value chain actors.

## 8 Laws and legislative framework governing livestock vaccine distribution and delivery

Uganda mainly relies on imported vaccines for livestock disease control. The National Drug Authority (NDA) is the agency mandated to ensure the availability of efficacious and cost-effective animal drugs and vaccines. However, the *NDPA Act* is silent on gender dynamics in distribution and delivery of veterinary products and vaccines. In discussions with them, policymakers and regulators indicated that they lack policies that would encourage gender mainstreaming in their functions. Private vaccine manufacturing and importation companies such as Brentec Vaccines Ltd and MTK Uganda Ltd indicated they do not have gender policies in place but have developed what they consider institutional gender responsive practices within their organisations such as having women in key leadership positions.

Following macroeconomic reform policies of liberalisation and privatisation put in place in the 1990s, animal disease control became the responsibility of the farmer except for four diseases: rinderpest, foot and mouth disease, contagious bovine pleuropneumonia, and rabies, where the government retained the responsibility for procuring and administering vaccines at no cost to the farmer. The rest of the diseases, including PPR and ND, were deemed “private good” and the responsibility of the farmer, mostly women, since these affect small animals.

These policy changes mean reduced access to veterinary services. Farmers now rely on resource-limited agrovet shops to access PPR and ND vaccines. Clinical services are limited since one veterinary officer is responsible for three sub-counties, covering 30,000 households. Sembabule recently experienced a PPR outbreak, resulting in heavy losses of livestock. One female farmer in Lugusulu subcounty lost 86 goats in two weeks allegedly due to PPR. There is low adoption of use of PPR and ND vaccines. Vaccines are one of the most cost-effective and sometimes the only means to prevent disease in livestock populations and any vaccines aimed at improving animal health are likely to provide benefits particularly to women smallholder farmers.

A review of the laws, policies, and regulations for vaccine manufacture, importation, distribution, and delivery in the country from a gender perspective, building capacity and providing resources for regulators to implement, enforce, and monitor existing gender policies, is necessary to create a more supportive environment for women smallholders, and this requires political will. At the delivery level, providing skills and training in the form of capacity building for female deliverers as well as raising awareness about the importance of the ND, RVF, and other livestock vaccines that are of relevance to women smallholder farmers, is a necessity. Establishment of an LVVC “innovation platform” that allows different LVVC actors to work together to create systemic gender transformational change

along the LVVC, can help target women's individual and collective processes that improve entrepreneurship and self-reliance, and foster institutional cooperation to transform gender norms. Using GTAs that address both fundamental causes, and consequences of gender inequality, an approach that looks at both the social context that allows the inequities to exist and persist as well as the enhancement of the opportunities in terms of resources, technologies and environment, can lead to better development outcomes for women. This is particularly relevant in the livestock vaccine value chain since it exists within this social context. LVVC partners require capacity and resources to understand how to apply existing national commitments to gender equality policies to their internal management, and then to implement, enforce, and monitor them. GTAs are required to address the systemic barriers women face when raising goats and chickens, from organisational goals and accountability in animal health services, to household level attitudes and behaviours that limit women's empowerment.

## Conclusion

The crucial role played by rural women in livestock production and management must be more widely recognised by decision-makers in the LVVC, and not limited to academic journals. Women as well as men must benefit personally, socially, and economically from keeping livestock, and policies and practice must be reformed to achieve this. The empowerment of women smallholder livestock producers leads to increased productivity, improved livelihoods and family well-being, and enhanced food security.

The control and eradication of livestock diseases is only possible with involvement of all stakeholders along the LVVC, from vaccine manufacturers and distributors, regulators, deliverers, and women smallholder farmers who are mainly at the end-user level. According to Rathod, Chander, and Bangar (2016), global eradication of rinderpest was only possible due to the roles played by all stakeholders, including livestock owners. This was achieved with minimal understanding of gender dynamics in livestock keeping because cattle are considered an animal for men. Disease control for goats and chickens must include the women who care for them every day, and rely on them to feed, clothe, and educate their families. A holistic and sustainable model that focuses on systemic transformational change within the animal health sector to value women's contribution, and support their empowerment is essential. Effective GTA requires political commitment to changing the *status quo*, allocation of budget for resources for trained staff and their transportation, and adequate time for reflection and change – otherwise, gender inequalities will persist or even increase after many development interventions. A holistic and sustainable model that focuses on systemic transformational change and empowerment for the women smallholder farmers is essential. Vaccine uptake is a complex process which requires buy-in from men and women farmers, veterinary departments, county/district and national governments, and vaccine producers. Vaccine uptake ultimately depends on the social context and must respond appropriately to the power dynamics in the household, community, and across the entire livestock vaccine value chain. We have to recognise intra-household dynamics, control over resources, and who decides what. Gender roles and relations in the households intersect with positions, relationships, and responsibilities which must be understood to create truly transformative projects that raise the position of women relative to men. The gender-blind history of livestock development projects has all too often resulted in increasing the workload of women without empowering them. Coupling interventions that enhance the equity of the social environment in the LVVC and technical components such as training, and provision of the cold chain, can enhance women's instrumental agency, and lead to better outcomes for women, men, their families, and communities.

In Uganda, vaccines to control livestock diseases are mainly imported, so they are expensive and easily faked, so quality may be poor, limiting their benefits to women smallholders. However, women can engage in SHGs, which can be leveraged to access resources more cheaply and easily, by negotiating with potential suppliers. Women's SHGs are a critical entry point to empower them and to



improve their access to resources. Increasing women's collective agency, their bargaining power, and autonomy can be supported through strengthening the SHGs, and joining with more formal networks, such as cooperatives, producers' organisations, and associations. Training and resources to run local businesses, such as vaccine distributors and deliverers, also provides upward mobility for women.

In the animal health sector, there were very few women involved in delivering veterinary services. Dialogue meetings with national and subnational policymakers to address issues such as licensing procedures, regulations, and rules for vaccine importation and distribution, and sale of vaccines by the private sector, have started the process of improving vaccine accessibility for women smallholder farmers. Gender-responsive policies and accountability will increase success.

In animal health service delivery, there were very few women involved in delivering veterinary services. Dialogue meetings with national and subnational policymakers to address issues such as licensing procedures, regulations, and rules for vaccine importation, gender responsive policies, and distribution and sale of vaccines by the private sector can go a long way in increasing vaccine accessibility for women smallholder farmers. Gender-responsive policies and accountability will increase success. Legal and policy frameworks favour men, despite the official commitment to gender equality. This is reinforced by cultural norms and practices that relegate women to the periphery. Use of established gender transformative actions to address the beliefs, attitudes, and behaviours which perpetuate women's subordinate status to men leads to strengthening women's intrinsic agency through increased confidence and respect.

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## References

- Acosta, Daniel, Nargiza Ludgate, Sarah L. McKune, and Sandra Russo. 2022. "Who Has Access to Livestock Vaccines? Using the Social-Ecological Model and Intersectionality Frameworks to Identify the Social Barriers to Peste des Petits Ruminants Vaccines in Karamoja, Uganda." *Frontiers in Veterinary Science* 9: 831752. doi:10.3389/fvets.2022.831752.
- Alemu, Sintayehu H., Luuk Van Kempen, and Ruerd Ruben. 2018. "Women Empowerment Through Self-Help Groups: The Bittersweet Fruits of Collective Apple Cultivation in Highland Ethiopia." *Journal of Human Development and Capabilities* 19 (3): 308–330. doi:10.1080/19452829.2018.1454407.
- Alesina, Alberto, Bendetta Brioschi, and Eliana Le Ferrara. 2016. Violence Against Women: A Cross-Cultural Analysis for Africa." *National Bureau of Economic Research Working Paper* no. 21901. doi: 10.3386/w21901.
- Alkire, Sabina, Ruth Suseela Meinzen-Dick, Amber Peterman, Agnes R. Quisumbing, Greg Seymour, and Ana Vaz. 2012. *The Women's Empowerment in Agriculture Index*. Washington, D.C.: International Food Policy Research Institute. <http://ebrary.ifpri.org/cdm/singleitem/collection/p15738coll2/id/127346>.
- Amoia, Charlie Franck Arthur N'Guessan, Pius Ajanwachukwu Nnadi, Chuka Ezema, and Emmanuel Couacy-Hymann. 2021. "Epidemiology Of Newcastle Disease In Africa With Emphasis On Côte D'Ivoire: A Review." *Veterinary World* 14 (7): 1727–1740. doi:10.14202/vetworld.2021.1727-1740.
- Bagnol, Brigitte. 2009. "Gender Issues in Small-Scale Family Poultry Production: Experiences with Newcastle Disease and Highly Pathogenic Avian Influenza Control." *World's Poultry Science Journal* 65 (2): 231–240. doi:10.1017/S0043933909000191.
- Britton, Andrea, Alexandre Caron, and Berhanu Bedane. 2019. "Progress to Control and Eradication of Peste des Petits Ruminants in the Southern African Development Community Region." *Frontiers in Veterinary Science* 6: 343. doi:10.3389/fvets.2019.00343.
- Brody, Carinne, Thomas de Hoop, Martina Vojtkova, Ruby Warnock, Megan Dunbar, Padmini Murthy, and Shari L. Dworkin. 2017. "Can Self-Help Group Programs Improve Women's Empowerment? A Systematic Review." *Journal of Development Effectiveness* 9 (1): 15–40. doi:10.1080/19439342.2016.1206607.
- Doss, Cheryl R., and Ruth Meinzen-Dick. 2015. "Collective Action Within the Household: Insights from Natural Resource Management." *World Development* 74 (10): 171–183. doi:10.1016/j.worlddev.2015.05.001.
- FAO. 2018. *Transforming the Livestock Sector Through the Sustainable Development Goals Report*. Rome.
- Gannaway, Tess, Denis Majyambere, Mary Kabarungi, Liberata Mukamana, Fidele Niyitanga, Janna Schurer, Beth Miller, and Hellen Amuguni. 2022. "Using Outcome Mapping to Mobilize Critical Stakeholders for a Gender Responsive Rift Valley Fever and Newcastle Disease Vaccine Value Chain in Rwanda." *Frontiers in Global Women's Health* In press. doi:10.3389/fgwh.2022.732292.
- Gumed Ntombizonke, A., Mbongeni Maziya, and Sarah Chiumbu. 2019. *Gender Dynamics Within Small Scale Farming: Narratives of Small Holder Livestock Farmers in Five Provinces, South Africa*. Human Sciences Research Council.
- Howell, Olivia. 2016. How Empowering Female Farmers Could End World Hunger." *Global Citizen*, August 11. <https://www.globalcitizen.org/en/content/how-empowering-women-could-end-world-hunger/>.
- Hsieh, Hsiu-Fang, and Sarah E. Shannon. 2005. "Three Approaches to Qualitative Content Analysis." *Qualitative Health Research* 15 (9): 1277–1288. doi:10.1177/1049732305276687.

- Jones, Bryony A., Karl M. Rich, Jeffrey C. Mariner, John Anderson, Martyn Jeggo, Sam Thevasagayam, Yi Cai, Andrew R. Peters, and Peter Roeder. 2016. "The Economic Impact of Eradicating Peste des Petits Ruminants: A Benefit-Cost Analysis." *PLoS ONE* 11 (2): e0149982. doi:10.1371/journal.pone.0149982.
- Kabeer, Naila. 1999. "Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment." *Development and Change* 30 (3): 435–464. doi:10.1111/1467-7660.00125.
- Kabeer, Naila. 2005. "Gender Equality and Women's Empowerment: A Critical Analysis of the Third Millennium Development Goal 1." *Gender & Development* 13 (1): 13–24. doi:10.1080/13552070512331332273.
- Kimaiyo, Joan Cheron, Mieke Sophia Bourne, Joseph Kibet Tanui, Vincent Onguso Oeba, and Jeremias Jasper Mowo. 2017. "Fostering Collective Action Amongst Smallholder Farmers in East Africa: Are Women Members Adequately Participating?" *African Journal of Gender and Women Studies ISSN* 2 (5): 111–123. <https://www.internationaljournals.com/articles/fostering-collective-action-amongst-smallholder-farmers-in-east-africa-are-women-members-adequately-participating.pdf>.
- Kishor, Sunita. 2000. "Empowerment of Women in Egypt and Links to the Survival and Health of Their Infants." In *Women's Empowerment and Demographic Processes: Moving Beyond Cairo*, edited by Harriet B. Presser, and Gita Sen. Oxford: Oxford University Press.
- Kristjanson, Patti, Ann Waters-Bayer, Nancy Johnson, Annita Tipilda, Jemimah Njuki, Isabelle Baltenweck, Delia Grace, et al. 2014. "Livestock and Women's Livelihoods." In *Gender in Agriculture*, edited by A. Quisumbing., R. Meinzen-Dick, T. Raney, A. Croppenstedt, J. Behrman, and A. Peterman, 209–233. New York: Springer.
- Kristjanson, Patti, Ann Waters-Bayer, Nancy Johnson, Annita Tipilda, Jemimah Njuki, Isabelle Baltenweck, Delia Grace, and Susan Macmillan. 2010. Livestock and Women's Livelihoods: A Review of the Recent Evidence." Discussion Paper No. 20. Nairobi, Kenya, ILRI. <https://hdl.handle.net/10568/3017>.
- Kyotos, Kitoga Byalungwa, Jemimah Oduma, Raphael Githaiga Wahome, Catherine Kaluwa, Faduma A. Abdirahman, Angela Opondoh, Jeanette Nkatha Mbobua, et al. 2022. "Gendered Barriers and Opportunities for Women Smallholder Farmers in the Contagious Caprine Pleuropneumonia Vaccine Value Chain in Kenya." *Animals* 12 (8): 1026. doi:10.3390/ani12081026.
- Laven, Anna, Anouka van Eerdewijk, Angelica Senders, Catherine van Wees, and Roel Snelder. 2009. "Gender in Value Chains, Emerging Lessons and Questions, a Draft." *Netherlands: Agri-ProFocus*.
- Lubungu, Mary, and Rhoda Mofya-Mukuka. 2012. *The Status of the Smallholder Livestock Sector in Zambia*. Zambia: Indaba Agricultural Policy Research Institute.
- Luke, Nancy, and Kaivan Munshi. 2011. "Women as Agents of Change: Female Income and Mobility in India." *Journal of Development Economics* 94 (1): 1–17. doi:10.1016/j.jdeveco.2010.01.002.
- Malapit, Hazel, Agnes Quisumbing, Ruth Meinzen-Dick, Greg Seymour, Elena M. Martinez, Jessica Heckert, Deborah Rubin, Ana Vaz, Kathryn M. Yount, and Gender Agriculture Assets Project Phase 2 (GAAP2) Study Team. 2019. "Development of the Project-Level Women's Empowerment in Agriculture Index (pro-WEAI)." *World Development* 122: 675–692. doi:10.1016/j.worlddev.2019.06.018.
- Maziya, Mbongeni, Sarah Chiumbu, and Ntombizonke A. Gumede. 2019. *Smallholder Farmers' Knowledge of and Attitudes to Livestock Vaccinations: Challenges and Policy Implications in South Africa*. Human Sciences Research Council.
- Ministry of Trade Industry & Cooperatives. 2019. "Final Implementation Report for EPA TAPSS Project." <https://www.mtic.go.ug/download/final-implementation-report-for-epa-tapss-project/>.
- Murray, Janet, and Mary Ferguson. 2001. *Women in Transition Out of Poverty: An Asset Based Approach to Building Sustainable Livelihoods*. Canada: Women and Economic Development Consortium.
- Mutua, Edna, De Haan Noline, Tumusiime Dan, Jost Christine, and Bett Bernard. 2019. "A Qualitative Study on Gendered Barriers to Livestock Vaccine Uptake in Kenya and Uganda and Their Implications on Rift Valley Fever Control." *Vaccines* 7: 86.
- Njuki, Jemimah, and Pascal C. Sanginga. 2013. *Women, Livestock Ownership and Markets Bridging the Gender Gap in Eastern and Southern Africa*. London: Routledge.
- Odaga, Geoffrey. 2020. "Gender in Uganda's Tertiary Educational Distribution." *Social Sciences & Humanities* 2 (1): 1–12. doi:10.1016/j.ssaho.2020.100023.
- Okali, Christine. 2011. "Achieving Transformative Change for Rural Women's Empowerment." *Paper prepared for the Expert Group Meeting on Enabling Rural Women's Economic Empowerment: Institutions, Opportunities and Participation*, Accra, Ghana. <https://www.un.org/womenwatch/daw/csw/csw56/egm/Concept-noteFINAL.pdf>.
- O'Sullivan, Michael. 2017. "Gender and Property Rights in Sub-Saharan Africa: A Review of Constraints and Effective Interventions". *World Bank Policy Research Working Paper No. 8250*. <https://ssrn.com/abstract=3075609>.
- Quisumbing, Agnes R., Deborah Rubin, Cristina Manfre, Elizabeth Waithanji, Mara van den Bold, Deanna Olney, Nancy Johnson, and Ruth Meinzen-Dick. 2015. "Gender, Assets, and Market-Oriented Agriculture: Learning from High-Value Crop and Livestock Projects in Africa and Asia." *Agriculture and Human Values* 32 (4): 705–725. doi:10.1007/s10460-015-9587-x.
- Rathod, Prakashkumar, Mahesh Chander, and Yogesh Bangar. 2016. "Livestock Vaccination in India: An Analysis of Theory and Practice Among Multiple Stakeholders." *Revue Scientifique et Technique (International Office of Epizootics)* 35 (3): 729–739. doi:10.20506/rst.35.3.2564.

- Rubin, Deborah, Seyoum Tezera, and Lindsay Caldwell. 2010. *A Calf, a House, a Business of One's Own: Microcredit, Asset Accumulation, and Economic Empowerment in GL CRSP Projects in Ethiopia and Ghana*. Global Livestock Collaborative Research Support Program.
- Rugadya, Margaret, Esther Obaikol, and Herbert Kamusiime. 2004. *Gender and the Land Reform Process in Uganda: Assessing Gains and Losses for Women in Uganda*. Associates for Development.
- Taruvinga, Amon, Ardinesh Kambanje, Abbyssinia Mushunje, and Peter Mukarumbwa. 2022. "Determinants of Livestock Species Ownership at Household Level: Evidence from Rural OR Tambo District Municipality, South Africa." *Pastoralism* 12 (8): 1–11. doi:10.1186/s13570-021-00220-6.
- Uganda Bureau of Statistics. 2016. *The Uganda Poverty Assessment Report*. <https://thedocs.worldbank.org/en/doc/381951474255092375-0010022016/original/UgandaPovertyAssessmentReport2016.pdf>.
- USAID Interagency Gender Working Group. 2002. *Gender Integration Continuum*. [https://www.igwg.org/wp-content/uploads/2017/12/17-418-GenderContTraining-2017-12-12-1633\\_FINAL.pdf](https://www.igwg.org/wp-content/uploads/2017/12/17-418-GenderContTraining-2017-12-12-1633_FINAL.pdf).
- Weitzman, Abigail. 2014. "Women's and Men's Relative Status and Intimate Partner Violence in India." *Population and Development Review* 40 (1): 55–75. doi:10.1111/j.1728-4457.2014.00650.x.
- Yount, Kathryn M., Yuk Fai Cheong, Lauren Maxwell, Jessica Heckert, Elena M. Martinez, and Gregory Seymour. 2019. "Measurement Properties of the Project-Level Women's Empowerment in Agriculture Index." *World Development* 124 (104639): 1–57. doi:10.1016/j.worlddev.2019.104639.