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Gender dynamics and social implications of improved planted forages in smallholder piggery systems in Uganda

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Contents

List of tables

Summary

This report examines the gender dynamics and social implications - costs and distribution of benefits of planted forages, associated shifts in power dynamics of households and decision-making presented in the context of the potential impact of adopting of improved forages in the piggery systems in Uganda. Both men and women have adopted various varieties of improved forage of Brachiaria hybrids and others. Women adopters are mainly constrained by their limited access to and control over land; and limited capital. Men and women's adopters are affected by extreme seasonal variations, limited access to forage seeds and knowledge gaps. There is increased men's involvement in forage production and pig feeding, however, this is associated with the profitability of forages as a result of increased income from the sale of high-quality pigs. Both male and female participants saved time they would have otherwise used to collect feeds leading to engagement in economic activities such as farming and other business enterprises etc. Women and men's participation in decision-making in household and forage production prior to and after adoption revealed positive changes. Most men and women are more likely to undertake joint decision-making in forage management following the planting of improved forages. However, both men and women reported little and/ or no changes or no impact on their access to and control over land, income and fodder markets, but have an increased access to information and knowledge. Some economic benefits of improved planted forage include reduced cost of feeds, increased income and savings. Therefore, we conclude that there is a reduced labour burden on women, increased household income from forage production and improved feeding of pigs. Thus, improved forages are an appropriate strategy to improve pig productivity of smallholder farmers in Uganda.

Introduction

Pig production has become an increasingly important activity among smallholder farmers in Uganda over the past three decades. There has been a dramatic rise in the pig population from 0.19 to 3.2 million linked to increased pork demand due to consumer preference changes among other factors. The per capita consumption of pork is estimated to be 3.4 kg/person/year representing a ten-fold increase over the last 30 years. Pigs are an important asset for generating income to meet planned and emergency household financial needs (Ouma et al., 2013). Pigs are therefore a risk diversification and livelihood security strategy for many smallholder and poor households in Uganda. Despite the importance of pigs to rural livelihoods, pig productivity remains low in the smallholder pig systems of Uganda. This is linked to feed shortages especially in the dry seasons, poor and variable feed quality, the high cost of feeds, disease burdens, and poor prices of pigs on the markets.

In the rural and peri-urban smallholder production systems, pigs are traditionally offered a variety of forage-based diets comprising cassava leaves, sweet potato vines and peels, weeds, young pumpkin leaves, banana peelings, fresh bean leaves, cooked sweet potato tubers, Napier grass, avocado fruit, and papaya fruit. These feed types comprise 52-55% of pig diets in these systems with the remainder coming from grazing natural pastures (Lukuyu et al., 2017). Smallholder farmers gather most of the feeds off farm for several hours each day and feed pigs that are often tethered in homesteads. Occasionally pigs are allowed to scavenge for feeds within the village. Generally, there is an over-reliance on feeding pigs on collected feeds which, usually does not meet the nutritional requirements of pigs, and results in slow growth rates (Maass, et al., 2014). Women, youth and children provide most of the labour for collecting forages, feeding and watering pigs.

The high prices of commercial feed concentrates, poor quality and variable availability discourage farmers from using them resorting to locally available feed options to feed pigs. Climate smart livestock production practices such as formulating diets based in local feed resources and planted forages suitable for pig feeding have been identified as solutions to increasing pig productivity on smallholder farms. Planted forage legumes have been evaluated as one option for small and medium size pig producers (Heinritz et al., 2012). Research has shown that grazing pigs gained 113 kilograms more daily and were ready for market 24 days earlier than those having no forage. The green feed not only stimulated the appetite and caused the pigs to consume a larger amount of other feed but also enabled them to produce greater gain in live weight per kilogram of grain or concentrates consumed. When saving in feed per unit of gain is considered it shows gazing on high quality forage can be more beneficial. In Uganda, research has shown that there was considerable weight gain among the pigs fed on the locally formulated forage-based diets (local and silage diets) compared to those fed commercial feed diets (Carter et al., 2015). Despite the demonstrated benefits of planted forages as pig feed, the adoption rate has remained low due to lack of understanding of problems faced by farmers. The present study investigated the gender aspects of introducing improved planted forages suitable for pig feeding in Kamuli, Hoima, Masaka, and Lira districts of Uganda in 2016/17 by the Livestock CRP project.

Study purpose

This study focused on what happens beyond just farmers planting forages. We investigated the gender dynamics and social implications associated with the introduction of improved planted forages in piggery systems of Uganda. The following research questions addressed were:

(i) What are the social implications and gender dynamics of planted forages, especially regarding land and labour allocation between women, men and youth/children in the household?

(ii) What are the gender roles in decisions over forages and adoption of forage technologies? Specifically:
   a. How does forage production increase women's inclusion into the pig value chain and how do they benefit from it?
   b. How much time do cultivating improved forages save compared to collected forages?
   c. How does relieving the labour burden of collecting forages by women and youth/children affect different domains of women's social and economic empowerment?
   d. How do planted forages affect men's participation in pig and cattle feeding?
   e. What are the actual constraints and opportunities for women to engage in forage production, use and sale?
   f. How have planted forages affected household food security, depending on whose land they are planted?

Methods and procedures

A qualitative study design was used. The Focused group discussion tool was pretested once and revised to improve clarity, and to ensure cultural connotations are captured. This study was conducted in Hoima, Kamuli and Masaka districts in Uganda in 2018. A total of twelve gender-separated focus group discussions (FGDs) with 4 men and 4 women groups and 4 mixed- men and women. The FGDs were conducted in venues in villages near participants' homes. A total of 98 farmers received forage seeds of Brachiaria Hybrids - Cayman, Cobra and Mulato II, in all project sites in 2016 for planting. In addition, farmers received training on forage production and use. District veterinary officers (VO) listed potential participants who received forage seeds for planting and or received training on forages residing within the VO's jurisdictional area Kamuli district (n = 38 = 17 men and 21 women participants), Hoima district (n = 49 = 23 men and 26 women participants), and Masaka district (n = 47 = 23 men and 24 women participants). The inclusion criteria were farmers who had planted and used improved forages, a mix of both women and men, and different age groups. VOs orally informed potential participants in person that they were invited to participate in the FGDs and were informed about the venues.

Each FGD was led by a team comprising of lead facilitator, observer facilitator and a note taker, a timekeeper and translator where necessary. The team was trained on the questionnaires and FGD procedures before conducting the exercise. All discussions were conducted in Luganda, Lunyoro, or Lusoga languages, audio-recorded, transcribed verbatim, and translated into English. Field notes were taken by a second facilitator who observed the FGD. All FGDs opened with a prayer and a consent note was read to the participants in either Luganda Lunyoro, or Lusoga languages.

Participants we asked to decide if they wanted to voluntarily participate in the discussion or opt out at this point. All invitees agreed to participate. Permission was also sort from them to take photographs. No participants refused to have their photos taken. The FGD questions investigated the improved forage type adopted, labour burden and/ or relief of improved forage to women and youth/ children, effects of forage adoption on men's involvement in pig feeding, actual constraints and opportunities for women to engage in forage production, use and sale, perceived costs, benefits, and effects on the existing roles and responsibilities for men and women with respect to improved planted forage adoption. Each FGD lasted for about two and half hours. The responses and comments from each FGD were organized into spreadsheets following the order of guiding questions and modules to enable cross-group (gender) and cross-district comparison. Data were analyzed using NVivo 10 for Windows.

Participants

Participants the FGDs are shown in (Table 1). FGDs were held in two villages in Hoima and Masaka districts; and in three villages in Kamuli district. FGDs took place in Lunyoro, Luganda and Lusoga languages in Masaka, Hoima and Kamuli respectively.

Table 1: Location and participant numbers in all FGD study sites in Uganda

District	Village	Attendance	
		Men	Women
Kamuli	Namasagli and Butansi	10	12
Kamuli	Bugulumbya	7	9
Hoima	Businsi	11	16
Hoima	Buhamba	12	10
Masaka	Kabonera	13	11
Masaka	Kyanamukaka	10	13
Total		63	71

Source: FGDs surveys, Uganda, December 2018

Results

The results from the five communities revealed findings in relation to costs and benefits of planted forages, associated shifts in power dynamics of households and decision-making in the production of forages; and access to opportunities following the adoption of improved forages. The findings revealed that both men and women had adopted various varieties of improved forages and fodder trees such as Brachiaria grass cultivars Mulato I and II, Mulberry trees (*Morus* species), velvet bean (*Mucuna pruriens*), *Desmodium* species, butterfly pea (*Clitoria ternatea*), *Lablab purpureus*, *Canavalia brasiliensis* and *Sesbania sesban*. The sources included CIAT, ILRI and Kawanda Agricultural Research station. Results indicated that the costs and benefits as a result of adopting improved forages are unevenly distributed among men and women in the households. The following sections present the findings on gendered themes highlighting the environmental, human and social (access to and control over income, livestock and changes in decision-making), economic and productivity benefits/ impacts of improved planted forage adoption.

Gender roles and labour input in forage production, use and sale

Men and women farmers in the separate and mixed focused group discussions listed key activities performed in the production, sale and use of improved planted forage. The activities and the participation of men, women, and children are presented in Table 2. In general, men, women, and children are involved in activities associated with forage production, sale and use. However, children are more involved in activities such as digging, harvesting/collection of forage and weeding in Kamuli district which was not the case for other study sites. The results showed that both men and women across all sites jointly perform most of the tasks involved in forage production including ploughing/ land tillage, manure application, planting forages, and transplanting of seedlings. However, men in Hoima district tended to be more involved with activities such as slashing, conserving forages, selling forages, spraying of forages. On the other hand, women farmers contribute more in activities like weeding and irrigating forages where applicable, harvesting, chopping and feeding pigs.

Table 2: Men and women's participation and labour inputs in forage production, use and sale in Uganda

Participation by gender																		
Activities	Hoima district						Kamuli district						Masakaa district					
	Businsi			Buhamba			Butansi & Namasagali			Bugulumbya			Kabonera			Kyanamukaka		
	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J
Slashing		√				√			√			√			√			√
Digging			√			√			√			√			√			√
Plough & till land			√			√			√			√			√			√
Manure application			√			√			√			√			√			√
Transplanting			√						√			√			√			√
Planting			√			√			√			√			√			√
Irrigation		√			√			√			√				√			√
Weeding		√			√				√			√			√		√	
Spraying	√								√			√			√			√
Collecting/harvesting			√		√		√					√		√			√	
Chopping		√			√		√			√					√			√
Feeding			√			√			√			√			√			√
Forage conservation	x	x	x	x	x	x	√			√			x	x	x	x	x	x
Forage selling	x	x	x	x	x	x	√					√	x	x	x	x	x	x

Notes: M = Male, F=Female, J = Joint, X= Not applicable

Source: FGDs survey, Uganda, December 2018

Labour and time saving in forage production

The discussions on forage adoption and subsequent changes in women and men's daily activities revealed mixed responses amongst men and women participants. Both men and women participants reported that adopting improved planted forages saved them labour time they would have otherwise used to fetch feeds often too far away from their homesteads. Both men and women concurred that because improved forages are planted closer to homesteads, they are motivated to feed pigs due to easy access, hence saving time. Men and women farmers used the saved time on different social economic and personal activities. Women reported using the saved time to do other activities e.g. craft work that earns them extra income. This also affords them rare time to rest from their busy schedules of domestic chores. Unlike women, men used the time saved to engage in business activities such as shop keeping, fishing, trading in coffee etc. A few farmers reported experiencing no change due to the use of forages. One man suggested that chopping of forages has increased demand on his time. Some women also expressed concerns that although they have adopted improved forages their routine woman's daily activities have remained the same. One woman noted "As women we have a daily calendar, from bed, you know what you must do throughout the day and this is a women's daily life. I personally don't see the impact of forages as my daily activities have remained the same". Further probing revealed that these are farmers who have planted tiny portions of forages on their farms.

However, both men and women participants expressed concern that the establishment of forages occurs at a time when there are competing labour demands for various activities on farms. They said establishment of forages often coincides with the other food crop farming activities such as land cultivation, sourcing and application of manure and planting food crops. In addition, farmers still must carry out other regular livestock activities such as harvesting and chopping forages etc. However, participants added that while there is added labour demand for planting of forages, the demand eases off significantly once the forages are established. Participants reported that when feeding of forages begins, they get an opportunity to harvest forages in bulk and feed pigs over several days releasing more time for other farming activities.

'The introduction of planted forages has brought about readily available feeds close to my home and saves time for us to do other activities e.g. craft work and gives us enough time to rest' (Businsi female farmer, Hoima district).

'Planted forages also save us time to do other income generating activities, adds another female farmer' (Namasagli, Kamuli district).

A woman farmer feeding a tethered pig on forages in Kamuli district, Uganda. Photo by Ben Lukuyu, 2018.

Women and men decision-making in forage production on smallholder farms

To understand better men and women's decision-making roles in forage production, and their access to and control over benefits accruing from forage adoption, participants were tasked to compare their roles and access to opportunities before and after adopting forages (Table 3). The findings show that prior to forage adoption, men dominated most of the decision-making over forage production – where to plant, how much land to commit to forages and the number of animals to keep; access to fodder markets and the use of income from fodder. Findings show that forage adoption has influenced women's decision-making roles, with most decisions on forage production being taken jointly with men. Women have the decision power over when to plant forages and have better access to training and information of improved forages before and after the adoption. Men, however, still retain the access to fodder markets and control over income from fodder and the decision on land usage after the adoption of forages.

Our study demonstrates that forage adoption presented a shift in rights and changes in household decision-making because planted forages are a new crop to most farms and are being introduced for the first time. This introduction required households to decide on several management issues including - where to plant forage, size of land to use, how many pigs to keep and how to use forage. Participants explained that this required households to discuss and find the best option(s) of introducing the forages in their farming systems. This has forced a joint decision-making process to happen in most households.

One man said that 'Before the introduction of forage, we didn't have plots dedicated for forages. We used to feed our pigs on crop resides, sweet potato vines, collected amaranth species (cultivated as leaf vegetables) and kitchen waste which was mainly the work of women. "When the forages came, my wife and I sat to agree on where to plant the forages and the number of pigs to keep. So, there is some change in decision making". Both women and men agree that because they have small land sizes, they needed to use them very well and that requires careful consideration of how much land to plant forages to, where to plant forages and how many pigs to keep without facing difficulties of feeding. Men reported that although they have the right to land use, the benefits of improved forages to pig production are now bringing about "joint" decision-making over land use and particularly the number of pigs to keep. "Traditionally, land belongs to the men and women would not discuss land matters but because now the pig business benefits the whole family, we sit and agree" said a farmer from Bugulumbya, Kamuli. District'. Men farmers perceive decision making in pig production to be changing since they jointly decide where and how much fodder to plant. In most cases farmers prefer to plant fodder as close to the pig sty as possible to reduce the distances of transporting forage to pig sties.

Although, some women confirmed the assertion of men allowing them to make decisions in certain aspect of forages management and use, they reported that because of the principal role of men as household heads, they still influenced some of the decisions they make jointly. One woman posed 'Men decide where to plant forage. What do you make of the fact that most farmers with small land sizes plant forages on farm boundaries in Masaka district?'

Table 3 Decision-making, access to information and control of benefits in forage production and use

	Kamuli district				Masakaa district				Hoima district			
Who makes the decision?	Butansi & Namasagali villages		Bugulumbya village		Kyamuyimbwa village		Kabonera village		Businsi village		Buhamba village	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Where to plant forages	M	J	M	J	M	J	M	J	M	J	M	J
When to plant forages	J	J	J	J	J	J	J	J	M	J	M	J
Size of land used for forages	M	J	M	J	M	J	M	J	M	J	M	J
Number of animals to keep	M	J	M	J	J	J	J	J	M	M	M	J
Access to information on livestock	F	J	F	J	F	J	F	J	F	J	F	J
Access to training on forages	F	J	F	J	F	J	F	J	F	J	F	J
Access to fodder markets	M	M	M	M	M	M	M	M	M	M	M	M
Control over use of income from forages	M	M	M	M	M	M	M	M	M	M	M	M

Notes: M = Male, F=Female, J = Joint. 'Before' and 'After' refers to the adoption of forages

Source: FGDs for men and women, Uganda, December 2018

Access to and control over land, livestock and income

The narratives of women across all sites demonstrate that the adoption of planted forage has had little or no effect on their access to and control over land and livestock, stressing that men still held management rights over land and livestock. Women ascertained that culturally, it is men who own land and any decisions about land use are directed to men. Women however acknowledged that men are allowing them permission to plant forages on certain portions of land that would otherwise be reserved for food crops. Contrary to reports from women, male participants explained that although they have management rights over land, planting of forages have forced them to make "joint" decision-making over land use and the number of pigs to keep as earlier observed. One man said that allowing women permission to establish forages on certain portions of land over a long period of time gives them the access to control and use those portions of land. Men agreed that they are motivated to allow women rights to land use for establishing forages particularly next to the pig sty so that they don't have to walk long distances to search for pig feed which is often the role allocated to men.

On access to livestock, again traditionally, livestock belongs to men. However, both men and women agree that there is an emerging change of men consulting women on pig management because its normally a women's role to take care of pigs. Most men acknowledged the fact that they consulted with women on the number of pigs to keep matching the amount of feed they can produce on farm which gives them a feeling of greater ownership and control. This also ensures the pigs are fed well. Both men and women also agreed that planting forages encourages them to confine animals as they were able to cut and feed the forages. One man said 'This costs more money. When our pigs were scavenging and gazing naturally, I would just buy pigs or piglets and bring them home without worrying about whether feed is enough or not'

On access to income, participants agreed that men have traditionally had a bigger control on income from livestock activities. However, they noted there is some change especially with the use of income from piggeries since women are responsible of taking care of pigs. Since there is equal division of roles of managing pigs, men and women jointly agree on income use. One woman said, 'Before men used to sell the pigs and disappear with the money'.

Men and women access to training opportunities

The study participants attributed the adoption of planted forages to their increased access to trainings on forage production, management and use offered through the project; and the fact that they can sell excess fodder to neighbours. The farmers acknowledged that training workshops have offered them an opportunity to learn about forage production and related benefits. Both men and women, agreed that initially training workshops were left mainly to women. However, it was clear from discussions that men are increasingly beginning to participate in order to manage the forages better.

Farmers reported receiving training from ILRI's pork project in Uganda, Volunteer Efforts for Development Concerns (VEDCO), IOWA State University Uganda program and local government extension staff. Farmers reporting receiving training on forage establishment and management, on how to feed forage, chopping of forages and wilting forages before feeding but requested for more training on mixing of forage with other feeds.

Access to fodder market opportunities

It was evident that men have sole decisions over marketing of fodder. Both women and men however agreed that although forage trading was emerging in rural areas, it was not common, and buyers are offering low prices. Nevertheless, they ascertained that women are always home, so they hardly get information on fodder markets. In addition, they don't have strong bargaining power so they can easily be cheated. However, discussions did not reveal any increased access to market opportunities as a result of planting improved forages for women. Asked why they have little access to market opportunities, women attribute it to their limited mobility, limited access to market information and perceived weak bargaining power as compared to men. In Kamuli and Hoima districts, men however, reported the increased market opportunities in terms of higher price for pigs that are fed well. In particular, pigs fed on forage-based diets are perceived to have better meat quality (lean, less fat content and marbled) compared to commercial feeds. Farmers reported that traders appreciate pigs fed on forage and offer an additional UGX 30,000 - 50,000 in price (10-17% of the total price). Farmers also reported that they no longer sell young pigs but keep them to slaughter weight when they have enough forages to graze pigs on

How planted forages affect women and men's participation in pig feeding

Our findings show that men did not participate much in feeding pigs. However, there has been a significant increase in men's involvement in pig feeding following the introduction of planted forage on farms and particularly in Kamuli district (Table 4). Asked why planted forage has affected men's participation in pig feeding, both men and women participants agreed that men have now taken up the tasks of harvesting and chopping Napier grass which are perceived to be one of the hardest jobs. They also said that men's increased involvement was due to the convenience of easy access to planted forages which meant less time having to fetch feed. Men also sometime participate in feeding the pigs. One man said, "We would give ourselves a rating of 7/10 for our involvement in pig feeding after forage adoption'. Before the introduction of planted forages pigs were freely grazing in the open and fed on kitchen waste and collected feeds, tasks that were normally performed by women.

However, in Hoima district women participants intimated that apart from the reasons given above, men's increased participation is associated with the benefits that are now coming from the pig enterprise after the adoption of planted forages i.e. from the sale of pigs or forages. One woman explained that her husband picked up interest in forage production because he derives some benefits from it such as income form sales and also it freed him some time from fetching feed.

Without an outright opposition, the men confirmed women's voices that their involvement is as a result of the profit that is directly or indirectly related to forage production on farms. In Hoima, men stated that: "The increased availability of planted forages has boosted the growth of pigs and other livestock, hence there is increased income from pigs and milk as well. Because of the increased income, men are more involved in the piggery business", a male participant reported. Men and women participants agreed that in general the increased prices of pork have also influenced men's' involvement in pig management.

Table 4: The participation of men in forage production, feed processing and feeding of pigs

Fodder production/ pig feed activity	Ranking of participation in forage production, feed processing and feeding of pigs								
	Hoima District			Kamuli District			Masaka district		
	F	M	J	F	M	J	F	M	J
Land preparation (slashing/ bush clearing)	9	9	5	8	7	6	6	6	6
Bush burning	6	7	4	6	7	6	3	5	3
Hand digging	4	6	5	5	6	5	5	6	4
Ox/tractor ploughing	8	6	8	8	8	7	6	6	4
Tilling land to prepare for planting	X	X	X	8	9	7	4	7	4
Cultivating (to remove weeds to plant)	6	9	5	5	5	6	4	5	3
Transplanting fodder seedlings	X	X	X	5	3	5	X	X	X
Planting of crops and fodder	3	8	4	4	4	5	3	5	3
Spraying crops	2	5	3	6	4	6	3	4	4
Weeding crops and fodder	1	4	3	6	6	2	1	5	2
Fertilizer application	3	4	2	5	4	3	6	3	4
Manure application	X	X	X	5	5	3	6	3	4
General fodder management	X	X	X	4	8	5	X	X	X
Harvesting fodder	5	5	5	2	4	7	6	5	6
Irrigating fodder	X	X	X	3	3	2	X	X	X
Chopping fodder	5	5	5	1	1	8	4	5	7
Wilting fodder for feeding	4	2	1	3	2	1	2	3	1
Feed mixing	3	5	4	4	5	5	2	5	4
Feed storage	X	X	X	7	6	8	X	X	X
Feeding pigs	4	5	4	7	7	3	3	5	2
Transport of inputs/products on farm	5	5	5	5	4	6	4	5	3
Fodder selling	x	x	x	5	8	4	X	X	X

Notes: M = Male, F=Female, J = Joint. Ranking of participation: where 1 = low/ no participation; 5 = medium/partial participation and 10 = high/full participation

Perceived benefits of planted forages

Participants enumerated the benefits of planted forages on pig productivity (Table 5). Both male and female participants revealed that the main environmental benefits of planted forages are that pigs fed on planted forages yield more and high-quality manure; and the resulting manure is important in improving soil fertility on farms. Planted forages can also withstand drought. However, participants reported planted forages harden the soil. A range of economic benefits of planted forage were elicited by the participants. The narratives of both men and women farmers indicated that planted forages present opportunities for them to generate more income and/or make savings either through the sale of planted forage, reduced expenses on commercial feeds (maize, potato, etc.), that the healthy and heaver pigs fetch higher prices and labour savings due to easy access to planted forages. One farmer reported “I don’t have pigs, but I have a lot of forages which I sell for income”.

Table 5: Farmers perceived benefits of planted forages

Domain	Farmers perceived benefits of planted forages
Pig productivity benefits	The pigs grow faster and are healthy
	Pig don’t fall sick often
	Pigs come on heat for mating timely
	Pigs are less fatty and result in higher prices
Environmental benefits	Pigs fed forages produce more manure for application to crops- soil fertility
	The manure from pigs fed on forage is of good quality
	Forages are planted on steep slopes to control soil erosion
	Some of the planted forages withstand the dry season well
Economic benefits	Forages reduces on expenses incurred to buy commercial pig feeds. Savings made could be used to buy other inputs for pigs
	You can produce much more feed from a small land area of improved forages compared to natural pasture
	Farmers without pigs can sell forages for income

Constraints on women's engagement in forage production, use and sale

Despite the observed benefits of forage adoption, the discussions show that both men and women face different types of constraints to forage adoption (Table 6). Men's constraints were linked to forage production and training. However, women's constraints were mainly linked to land use, training and climate related constraints.

Table 6: Constraints faced by women and men in forage production and use in Uganda

Gender	Fodder constraints observed
Male	Forage pests and diseases
	Climate change effects – Unreliable/insufficient rainfall, prolonged dry seasons
	Theft of planted forages at night
	Limited access to forage seeds of improved varieties
	Competing uses for land between crops and forages
	Lack of follow up and trainings on forages
Female	Limited land. A challenge to allocate land to food crops and planted forages
	Prolonged droughts
	Poor germination of the forage seeds provided
	Lack of information on feeding forages
	Project did not learn lessons from farmers experiences

Discussion

The purpose of this study was to explore gender dynamics and social implications of improved planted forages. The study involved qualitative analysis from focus group discussions (FGDs) with 12 gender separated FGDs in Uganda. It explored land ownership, land use, control and access, division of labour, decision-making, the distribution of cost and benefits, constraints and opportunities related to forage production on smallholder farms. The findings revealed that men and women are active participants in forage production on smallholder farms. Additionally, planted forages present differential costs and benefits for men and women farmers including changes in decision-making in forage management, reduced labour for sourcing feeds, more and less costly feeds leading to increased savings; time relief from sourcing for feeds that is converted to engagement in other economic and leisure activities, women's increased access to trainings and information; and men's increased involvement in feeding, increased access to the sale of forage and healthier livestock for income.

The study revealed that men and women perform tasks related to improved forage production, sale and use. Generally, men's involvement was prominently associated with land preparation activities including slashing and bush clearing, digging and cultivating land. They are also partly involved in feed mixing, feed storage, feeding pigs and fodder selling. Women farmers on the other hand, are more active in planting and weeding forages, chopping feed, feeding, and irrigation where applicable. However, women's increased labour could be partially explained in terms of added roles of other forage production related activities to their daily household activities. This finding indicates the critical role women play in forage and pig production and its consistent with the findings of Arora et al., (2017) and Njarui et al., (2012) who found that women significantly participate and provide labour in forage and livestock production.

This study also showed that planting improved forages on smallholder farms has increased men's participation in feed preparation and feeding of pigs. However, it emerged that men's involvement is somewhat motivated by the emerging potential benefits and profitability of planted forages. This finding, therefore, suggests that women may be less likely gain the full privileges and benefits of improved planted forage as men gradually intercede. This result is consistent with findings of Quisumbing & Kumar, (2011) and von Braun & Webb, (1989) who found that women have limited access to, and loose full rights over, economic activities that appear profitable and have the potential to increase the income status of women.

Despite women's active participation in forage production, our findings showed that there is a gender imbalance in women's access to fodder markets and income from the sale of planted forages. Men attributed this to women's limited access to market information and weak bargaining power. Again, men's intervention in the potentially profitable sale of fodder is a pointer to women's limited benefit or elimination from market participation altogether. This finding suggests that there may be unequal distribution of benefits coming from planting of improved forages, with women mostly losing out. This finding is consistent with the findings of Arora et al. (2017) and Theis et al. (2018). Given the big role of women in forage production in Uganda, this trend may affect the adoption of planting forages in the long run. Indeed, Theis et al. (2018) points out that men who usually have access to the market and control the proceeds from a technology will mainly use the generated income to meet their needs, rather than that of women and/ or the household.

There is evidence in the literature that shows that new technologies can either reduce the labour burden especially for women and/ or exacerbate their time burden, subsequently, affecting their well-being and development (Arora et al., 2017; Benard, et al., 2016; Theis et al., 2018). The findings of this study reinforce these observations because the introduction of improved forages brings additional labour and results in time savings for both women and men. Men adopters of improved

planted forages reported an additional labour burden of preparing land for planting forages and chopping forages for pigs but at the same time they save time that they use to engage in economic activities such as business, other farming activities etc. Women on the other hand, face an increased labour burden by participating in activities that are associated with forage production and use such as cultivating, application of fertilizer, weeding and harvesting but they also save time which they use to engage in craft work that earn them extra income and also affords then rare time to rest from their busy schedules of domestic chores. Most importantly, women pig farmers in Uganda carry out forage-related activities concomitantly with their daily activities, hence, bearing the double burden of reproductive and productive work as reported previously (Arora et al., 2017; Benard, et al., 2016). It is therefore important to bear in mind that improved planted forages can potentially reduce the labour burden and save time for women to participate in other economic activities but may also be a constraining factor if not planned well.

One of the major findings of this study is the variation in men and women's participation in decision-making for forage production in terms of management rights- size of land to use, where to plant, when to plant, how many pigs to keep (use) etc. Generally, adoption of improved forage appears to promote joint decision-making where women are jointly active participants with men on decision-making as compared to when they did not plant forages. This implies women are now empowered to bargain with men for their preferences and needs of forage production to be considered. However, it is important to note that men have a stronger and reserved management rights over land use, which will continue to limit women's ability to express their preferences and needs in forage production Thus, in the context of Uganda where women have limited access to land, their preferences and needs in forage production are more likely to be affected. This finding concurs with that of Theis et al., (2018), who reported that in cases where women face several bundles of hindrances in management rights, it reduces the ability of women to adopt a technology compared to men.

Economically, improved planted forages ensures the availability of forages for livestock production and reduces time spent sourcing feed off farm and hence alleviates feed shortages on smallholder farms in Uganda. In addition, planted forages have the potential to increase household income. This finding agrees with similar work of Lukuyu et al., (2017). Overall, farmers who adopt improved planted forages can reduce feeding costs, improve nutritional value of pig diets and ensure a constant supply of feed throughout the year.

Conclusions

This research is one of the few that highlights women's critical roles in forage production, sale and use on smallholder farms. This study has contributed to the knowledge of how gender dynamics influences the growing of improved planted forages. The study focused on what happens beyond smallholder farmers just planting and using planted forages. Overall, the findings show that, there are gendered dynamics and social implications during and beyond planting of improved forages. There has been a significant increase in men's involvement in pig feeding following the introduction of planted forage on farms in Uganda.

Results indicate that the costs and benefits as a result of adopting improved forages are unevenly distributed among men and women in the households. Prior to forage adoption, men dominated most of the decision-making over forage production – where to plant, how much land to commit to forages and number of animals to keep; access to fodder markets and use of income from fodder. Women have the decision power over when to plant forages and have better access to training and information of improved forages before and after the adoption. Men, however, still retain the access to fodder markets and control over income from fodder and the decision on land usage after the adoption of forages.

References

Arora, D., Arango, J., Burkart, S., Chirinda, N., & Twyman, J. (2017). Gender [im] balance in productive and reproductive labor among livestock producers in Colombia : Implications for climate change responses. Copenhagen, Denmark. https://doi.org/DOI: 10.13140/RG.2.2.14500.88965

Mora Benard, M.A., Mena Urbina, M.A., Corrales, R., Hoek, R. van der. and Ojango, J.M. 2016. The silent cattle breeders in central Nicaragua. IN: Pyburn, R. and Eerdewijk, A. van. 2016. A different kettle of fish? Gender integration in livestock and fish research. Volendam: LM Publishers. https://hdl.handle.net/10568/78649

Heinritz, S N Hoedtke, S Martens, S D., Peters M., & Zeyner, A. (2012). Evaluation of ten tropical legume forages for their potential as pig feed supplement. Livestock Research for Rural Development 24 (1) 2012

Lukuyu, B., Lule, P., Kawuma, B., & Ouma, E. (2017). *Feeds and forage interventions in the smallholder pig value chain of Uganda* (No. 78). Nairobi, Kenya. Retrieved from https://hdl.handle.net/10568/80379

Maass, B.L., Kabirizi, J.M., Danilo P., Natalie C., Ouma, E., Zziwa, E., & Wanjiku L. C. (2014). Opportunities for feeding forages to pigs in Uganda. Conference: Tropentag 2014: "Bridging the gap between increasing knowledge and decreasing resources", 17-19 Sep. 2014. At: Czech University of Life Sciences, Prague, Czech Republic.

Carter, N., Dewey, c., Lukuyu, B., Grace, G,. de Lange., C. (2015) Nutritional Value and Seasonal Availability of Feed Ingredients for Pigs in Uganda. *Agricultura Tropica et Subtropica 48 (3-4):91-104.* https://doi.org/10.1515/ats-2015-0013

Njarui, D. M. G., Kabirizi, J. M., Itabari, J. K., Gatheru, M., Nakiganda, A., & Mugerwa, S. (2012). Production characteristics and gender roles in dairy farming in peri-urban areas of eastern and central Africa. *Livestock Research for Rural Development*, *24*(7).

Ouma, E.A., Dione, M.M., Lule, P.M., Roesel, K., Mayega, L., Kiryabwire, D., Nadiope, G., Pezo. D.A. (2013). Characterization of smallholder pig production systems in Uganda. Nairobi: ILRI. https://hdl.handle.net/10568/29094

Quisumbing, A. R., & Kumar, N. (2011). Does Social Capital Build Women ' s Assets ? The Long-Term Impacts of Group – Based and Individual Dissemination of Agricultural Technology in Bangladesh. *Journal of Development Effectiveness*, *3*(2), 220–242.

Theis, S., Lefore, N., Meinzen-Dick, R., & Bryan, E. (2018). What happens after technology adoption? Gendered aspects of small-scale irrigation technologies in Ethiopia, Ghana, and Tanzania. *Agriculture and Human Values*, *35*(3), 671–684. https://doi.org/10.1007/s10460-018-9862-8

von Braun, J., & Webb, P. J. R. (1989). The Impact of New Crop Technology on the Agricultural Division of Labor in a West African Setting. Economic Development and Cultural Change, 37(3), 513–534. https://doi.org/10.1086/451740.