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Urban Agricultural Practices, Challenges, and Opportunities: The Case of Ambo and Waliso Towns, Oromia Region, Ethiopia

Dawit Milkias[1], Regasa Dibaba Wake[1], and Agajie Tesfaye[2]
[1]Ethiopian Institute of Agricultural Research, Ambo Agricultural Research Center, P.O. Box: 37, Ambo, Ethiopia; [2]Ethiopian Institute of Agricultural Research, P.O. Box: 2003, Addis Ababa, Ethiopia;
Correspondence: *Email: mkdave04@gmail.com*

Abstract

The study was conducted in the towns of Ambo and Waliso with the main objective of assessing the types, technology use practices, contributions of urban agriculture to agriculture household livelihoods, and challenges faced by urban agriculture producers. It focused on all types of urban agricultural practices and related activities carried out in cities. The study used descriptive methods with qualitative survey data. Agricultural production is heavily reliant on improved agricultural technology use by agriculture households, and the gap is influenced in part by the level and types of appropriate technology used. Improved agricultural technologies entail the use of various breeds, varieties, and practices that necessitate knowledge and skill in application and management practices. Producers in urban agriculture have adopted and used various agricultural technologies to some extent, but the adoption of these technologies has not been completely optimal. Introducing new dairy and poultry technologies should be supported by continues training or technical assistance on how to manage and use the technology. Producers' deviation from using improved agricultural technologies was found to be partly due to low awareness, a lack of proper agriculture technologies, and agriculture households lack of financial capacity to use improved agricultural technologies in accordance with recommendations. The study result revealed that urban agriculture has played a significant role in improving the livelihoods of urban agriculture households. It has provided households with additional income, a fresh food source, and employment opportunities for youth and women. Lack of feed supply, problems with appropriate dairy cows and poultry chickens, high prices of agriculture inputs, insufficient modern agriculture facilities and tools, absence of training and experience sharing visits with proper technology use, unavailability of credit services, poor technical support from agricultural offices and respective organizations, problems with selling places and linkages were the major challenges to urban agriculture in Ambo and Waliso towns. The study findings would help in addressing the need for genuine urban agricultural development interventions, appropriate technology generation, and cost-effective methods to boost urban agricultural productivity and contribute to household livelihood improvement.

Keywords: Urban Agriculture, Agricultural technology, Opportunities, Challenges

Introduction

Background

Urbanization is accelerating in many countries. Over half of the world's population now lives in cities and towns, and expected to rise to 60% by 2030 (Bisaga *et al*., 2019). As the world becomes more urbanized, the food supply and urban environment are put under

pressure, especially in rapidly developing cities, resulting in complex socioeconomic and demographic characteristics (Ranagalage *et al*., 2021). So, it has been recognized that governments can create jobs through urban agriculture, especially for women and young people (Mahteme and Akalewold, 2020). Residents of cities are involved in urban agriculture, either directly or indirectly. The rural-urban population flow is growing, primarily in search of better job opportunities and a better life (Terfa *et al*., 2019; Busho *et al*., 2021).

However, most urban areas are unable to accommodate all of the skilled and unskilled labor that congregates around. As a result, governments and urban administrations are having difficulty creating jobs and providing adequate food for urban dwellers. In response to these challenges, governments are implementing a number of initiatives to strengthen urban agriculture as an alternative source of food and income. Agricultural planners misunderstand people's desire to grow food in cities (Deelstra and Girardet, 2004). To improve household income and livelihood, cities and towns may need to consider agricultural production in their respective urban areas or on the urban fringes. Urban agriculture has been identified as one of the government's options for creating job opportunities, particularly for youths and women.

Urban agriculture is a traditional practice in Ethiopia, and urban dwellers are used to raising cattle, sheep, and chickens or growing rain-fed crops, fruits, and vegetables on plots adjacent to their homes (Gittleman, 2009). Dairy, fattening, fruits and vegetables, poultry, and other sectors have been identified as potential contributors to urban agriculture. It is commonly practiced as an informal economic sector in many cities and towns across the country. Urban agriculture is a viable activity for supplementing food supplies from rural areas to towns and cities, it is also a source of income for many urban poor, and its importance has been overlooked (Manga *et al*., 2021; FAO, 2022). Despite urban agriculture has been practiced along Ethiopia's riverine landscape, information on agriculture labor skills, technology use practices, market linkages, value-added practices and challenges of urban agriculture is limited. A few studies have been done on urban agriculture, and they have been outdated and focused on particular commodities (Tewodros, 2007; Girma, 2010; Agajie and Bart, 2018). The focus of this study was to provide adequate information on urban agriculture carried out in Ambo and Waliso towns for targeted research, development, and urban agricultural extension services.

The study covered a wide range of urban farming practices. The study has produced information that would be useful to agricultural researchers and extensionists, development partners, policymakers, municipal governments, and other development actors. This study was undertaken in selected towns with objectives identifying types urban agriculture, and technology use practices, prioritize major challenges and opportunities in urban agriculture practices, as well as generate information that required interventions to improve urban agriculture productivity.

Research Methodology

The Study area

The study was conducted in the towns of Ambo and Waliso, the capital cities of the West Shewa and South West Shewa zones, respectively. These towns were chosen for urban agricultural practice studies because of their potential for urban agriculture, and they are also the target areas of large towns in the urban agriculture. The two towns have a large number of urban agricultural practices in various sectors as well as the potential to produce urban agriculture.

Sampling procedure

To select sample respondents, a two-stage sampling technique was used. In the first stage, two towns were selected from each study zone. The towns (Ambo and Waliso) were purposively chosen based on their representativeness of the two zones. In the second stage, respondents from urban agriculture were chosen randomly from the targeted participants. The sampling frame consisted of urban agriculture producers, consumers, agriculture input suppliers, collectors, artificial insemination technician, and agricultural experts. Individual urban agriculture producers for personal and key informant interviews (KII) were chosen from the sample frame. Actors in the urban agriculture were selected in consultation with each town's administrative agricultural office. Therefore, 30 respondents from Ambo town and 42 respondents from Waliso town were randomly selected from urban agriculture participants (Table 1). Finally, a total of 72 sample respondents were selected for this study considering different categories of farming practices and activities related to urban agriculture.

Table 1. Sampling distribution of households by urban agriculture practices and actors

S. No	Types of urban agriculture practiced	Ambo	Waliso	Overall
1	Dairy	11	17	28
2	Poultry	5	4	9
3	Dairy & Poultry	3	2	5
4	Dairy & other agriculture	1	9	10
5	Poultry & other agriculture	0	1	1
6	Animal fattening	2	0	2
7	Fattening & other agriculture	2	1	3
8	Nursey seedlings	0	1	1
9	Seedlings & other agriculture	0	1	1
10	Beekeeping & other agriculture	2	0	2
11	Crop production/vegetables	0	1	1
12	Collectors/milk collectors	0	3	3
13	Input supplier (factory, ATI, traders)	2	1	3
14	Agricultural experts & AI technician	2	1	3
	Total households	**30**	**42**	**72**

Source: Survey results, 2021

Note: AI-Artificial insemination; ATI-Agricultural transformation institute/one stop shops selling inputs

Data collection

The study collected both primary and secondary data sources. The data was gathered using a mix of formal and informal survey techniques, including key informant and individual urban agriculture producer interviews. Individual interviews were used to collect qualitative and quantitative primary data from selected urban agricultural actors

using checklists. Information gathered from urban agricultural actors such as individual agriculture businesses, agriculture input suppliers, consumers, and urban agriculture enablers. The key informants were selected based on their involvement in urban agriculture. The key informant interviewees were drawn from urban agriculture offices (agricultural experts, artificial insemination technicians), input suppliers (traders and factories), and urban agriculture consumers and collectors.

Data analysis

Using the proper instruments, the data management were undertaken and made ready for analysis. The data collected from the field survey was analyzed using descriptive techniques. The socioeconomic and urban agriculture-specific features of the respondents were described using descriptive statistics including frequency distribution/ percentage, mean, and graphs. We also used maximum and minimum to describe urban agricultural practices in the study towns. The chi-square test and the t-test were used to assess the relationship between the selected towns' urban agriculture practices and characteristics.

Results and Discussions

General socioeconomic characteristics of urban agriculture households

Household and agriculture characteristics

Socioeconomic characteristics, such as educational level, gender of the household head, and age were used to describe demographic characteristics of urban agriculture. According to study results, 74% of sample respondents in the study towns were male-headed. The results also revealed that 60% and 93% of respondents in Ambo and Waliso towns were male-headed households, respectively. The educational level of the agriculture household head can have an influence on how agriculture owners view urban agriculture, the use of new technologies, and business practices. Household educational levels in the study towns range from illiteracy to graduated levels. According to the survey results, the majority of the sample respondents (90%) received formal education in the study towns The proportion of illiterate urban agriculture producers was 17% and 5% in Ambo and Waliso towns, respectively. In Ambo and Waliso towns, the sample participants who attended secondary school were 30% and 50%, respectively. About 23% and 5% attended BSc and higher educational levels in Ambo and Waliso, respectively. The descriptive analysis of Pearson’s chi-square proportion difference test between the two towns shows that there is a significant difference in terms of sex and educational status of respondents at 5% and 10% levels of significance, respectively (Table 2).

Table 2. Sex and educational status of sample respondents

Sex and Educational status	Ambo		Waliso		Overall		χ2 (chi2)	P _value
	n	%	n	%	n	%		
Male	18	60	35	83	53	74	4.905	0.027**
Female	12	40	7	17	19	26		
Educational status								
Illiterate	5	17	2	5	7	10	9.802	0.081*
Primary school (1-4 grade)	2	7	4	9	6	8		
Primary school (5-8 grade)	4	13	6	14	10	14		
High school (9-12 grade)	9	30	21	50	30	42		
Certificate/Diploma	3	10	7	17	10	14		
BSc graduate or above	7	23	2	5	9	12		

Source: Survey results, 2021

Age is important in any business, particularly in agriculture, where family labor is widely used. As a result, the respondent's maximum and minimum age was 25 and 76 years, with a mean age of 46 years in Ambo town, respectively. In Waliso town, the age range is 18 to 72 years, with an average age of 44 years (Table 3). This indicates that the majority of urban agriculture households belonged to the vibrant age group.

Table 3. Age of sample respondents

Town	n	Mean	Minimum	Maximum	SD	t-test
Ambo	30	46	25	76	13.767	0.6190
Waliso	42	44	18	72	15.757	
Overall	72	44	5	76	16.202	

Source: Survey results, 2021

Dairy agricultures (milk), poultry agricultures (chicks and eggs), seedling nursery raising, fattening (sheep, oxen, and bulls), crop production (fruits and vegetables), and a combination of different agriculture were practiced in the Ambo and Waliso towns. The practice of urban agriculture and related activities were carried out in cities to meet the diverse needs of city dwellers. The majority of urban agriculture practices in Ambo town were dairy (42%), poultry (19%), combination of dairy and poultry production (12%). While, dairy (46%), dairy and other agricultures (24%), and poultry (11%) were the most common urban agriculture practices in Waliso town (Table 4). Private individuals operated the majority of urban agricultural practices (79%), with about 65% taking place in their primary residence compounds in the study towns. Dairy, poultry, animal fattening, beekeeping, fruits and vegetable production, and mixed agriculture are mostly concentrated in Ambo and Waliso town cores and periphery areas. Nursery seedling raising was primarily concentrated in areas along the river.

Table 4. Types of urban agriculture practiced in Ambo and Waliso towns, 2021

Descriptions	Ambo		Waliso		Overall	
	N	%	N	%	N	%
Types of agriculture practiced						
Dairy agricultures	11	42	17	46	28	44
Poultry agricultures	5	19	4	11	9	14
Dairy & poultry agricultures	3	12	2	5	5	8
Dairy & other agricultures	1	4	9	24	10	16
Poultry & other agricultures	0	0	1	3	1	2
Crop prod/vegetables.	2	8	0	0	2	3
Nursery seedlings raising	2	8	1	3	3	5
Nursery seedlings & other agricultures	0	0	1	3	1	2
Fattening	0	0	1	3	1	2
Fattening & other agricultures	2	8	0	0	2	3
Beekeeping & other agricultures	0	0	1	3	1	2
Types of agriculture business						
Private individual	26	100	27	73	53	84
Enterprise and groups/jobless	0	0	10	27	10	16
Where the agriculture business established						
In the compound	21	81	24	65	45	71
Away from home	5	19	13	35	18	29

Source: Survey results, 2021

Land, labor and capital availability

Urban agriculture producers obtained land from family, city administrators, and private individuals. The group of enterprises (unemployed youth and women) obtained land by leasing from governments. A few urban agricultural activities were also carried out by rented or shared land from other city dwellers. Town administrations provided lands for agriculture operations to some urban agriculture business owners.

The labour sources used in the urban agriculture practices was both family and hired labour forces. Mainly, urban agriculture used family labors (61%) and about 25% engaged both family and hired labour forces in Ambo and Waliso towns (Table 5). The labour sources used for urban agriculture were unskilled (79%) and few individual agriculture entrepreneurs engaged professionally as business owners. Therefore, the types of labour sources involved in urban agriculture practices were both family and hire labors with unskilled labor forces for operating agricultural activities.

Different financial sources were used for operators engaged in urban agriculture. Urban agriculture operators primarily funded their operations with personal funds. In the study towns, 79% of the urban agriculture producers carried out their operations with funding from their own sources. Donations (8%) and credit services (13%) were additional financial sources that some of them utilized for urban agriculture practices. Agriculture owners used credit services from microfinance and other sources for urban agriculture practices. Thus, the urban agriculture owners start businesses with their own money, using credit services and donations from certain institutions in Ambo and Waliso towns (Table 5). The initial capital required for urban agriculture practices was insufficient for operating agriculture practices. Borrowing capital from financial institutions for urban agriculture are difficult in the study towns.

Table 5. Sources of labour used in the urban agriculture (Ambo and Waliso towns, 2021)

Sources and types of labour used	Ambo		Waliso		Overall		χ^2	P _value
	n	%	n	%	n	%		
Family	17	61	24	62	41	61		
Hired labour	3	11	6	15	9	14	0.460	0.794
Both	8	28	9	23	17	25		
Types of labour used								
Skilled	2	7	0	0	2	3		
Unskilled	20	72	24	86	44	79	2.764	0.251
Both	6	21	4	14	10	18		
Sources of capital								
Own	22	79	31	79	53	79		
Credit	2	7	7	18	9	13	4.419	0.110
Donation	4	14	1	3	5	8		

Source: Survey results, 2021

Agriculture inputs acquisition

Processed feed, such as integrated poultry feed, was obtained from traders and factories for dairy and poultry production. Animal feeds were supplied by beverage and agro-processing factories, which mixed them with various grains for dairy and poultry feeding. Dairy farmers used dry grass and hay obtained from farmers and feed producers. Grain crops and other industrial byproducts were used as feed in dairy and poultry production. In Ambo and Waliso, traders provided balanced (concentrated feeds) and other feeds required for animal fattening, dairy, and poultry production. Some farmers used forages which multiplied in their small plots. They also used local beverage byproducts (*atela*) and breviary byproducts in dairy production. Grain crops and concentrated feeds were the most popular poultry feed sources in the study towns. Traders, food plants, and beverage factories provided concentrated feed types. Thus, agricultural entrepreneurs used purchased (87%) and both supplemented with their own feed sources (13%) available (Table 6). Feed types such as grass were mainly purchased from local farmers, whereas *fagulo, furishkilo,* and *furishka* were purchased from food factories (wheat milling and oil factories) as factory byproducts. Some inputs used in urban agriculture practices were supplied by individual business owners. However, providing the necessary quantity and quality of inputs for urban agriculture may be challenging. Urban agriculture inputs (feeds) were not available in the study towns at the required time or in a variety of feeds at an affordable price.

Table 6. Sources of inputs used in the urban agriculture

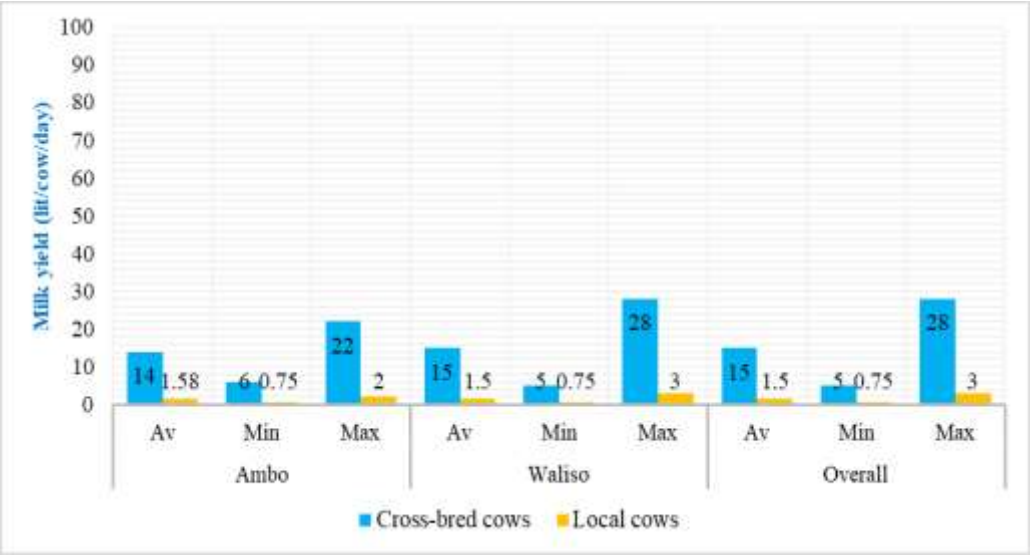
Sources of inputs	Ambo		Waliso		Overall	
	n	%	n	%	n	%
Only own	0	0	0	0	0	0
Purchased	21	81	34	92	55	87
Both purchased and own	5	19	3	8	8	13

Source: Survey results, 2021

Production and productivity of urban agriculture

Feed availability (concentrated feed, variety of feeds provided to cows), proper dairy barn handling, a favorable environment, and dairy cow breed types all contributed to dairy production productivity. Milk production from improved or cross-bred dairy cows in Ambo and Waliso towns averages about 15 liters per cow per day, with a minimum of 5

liters and a maximum of 28 liters. It was higher than the local one, which produced only 1.5 liters per day per cow in the towns. Local dairy cows produced 0.75 to 3 liters of milk per day in the study towns (Figure 1). To increase the productivity of urban dairy production, producers need to provide better feed and maintain improved management. Urban agriculture producers enhanced agricultural productivity by implementing better agricultural management practices and following up properly.



Source: Survey results, 2021
Figure 1. Productivity of milk from improved breed and local cows (lit/cow/day)

Capacity development and extension services

The formal extension system of government agricultural experts and veterinarians provides urban agriculture with advisory services and technical support for breeding services (AI), improved crop varieties, and improved agriculture management. Town administrative agricultural experts provide limited agricultural extension services on urban agriculture practices using new technologies and technical backstops for the urban agriculture producers. They provided advisory and AI services, vaccinations (medication services), and support with new agricultural technology practices. About 84% of urban agriculture producers received extension advice services from town agricultural offices. Experience sharing and exposure to visits were important for learning new agricultural technologies and improved agricultural management practices. Few urban agriculture producers received experiences sharing (31%) in the study towns. The exchange of improved agriculture visits was extremely beneficial to urban agriculture operations, assisting in the implementation of improved management practices in their agricultural activities. Urban agriculture producers received training in a variety of agricultural practices from various organizations. Only a few urban agriculture producers received and were exposed to capacity development training from various sources. About 43% of producers received training in a variety of topics in the study towns. In the absence of agricultural experts, there was limited access to reading production manuals (40%) related to urban agriculture production for guidance. There is no statistically significance

differences in exposure to capacity development and agricultural extension services among the two towns (Table 7). Urban agriculture entrepreneurs require additional training and experience-sharing visits about modern agricultural practices. They require training, field visits, and manuals to help them develop their urban agriculture capacity.

Table 7. Capacity development and extension services

Descriptions	Ambo		Waliso		Overall		χ2	P _value
	n	%	n	%	n	%		
Get extension services	21	78	35	88	56	84	1.110	0.292
Exposed to experience sharing	11	41	10	25	21	31	1.856	0.173
Received training	14	52	15	38	29	43	1.353	0.245
Read production manuals on agriculture	13	48	14	35	27	40	1.158	0.282

Source: Survey results, 2021

Technology utilization and marketing

Agriculture technologies such as milk churning and processing machines, feed mixers, incubators, and improved dairy cow and poultry breeds (chickens) are crucial for enhancing urban agriculture production and productivity. The majority of urban agriculture practiced in Ambo and Waliso towns used combination of traditional and improved production technologies. In the study towns, urban agriculture operators and entrepreneurs made use of improved technologies such as AI (artificial insemination services), medicines, and improved agriculture tools. They used improved dairy cow breeds, chickens, waterers, feeders, and improved crop varieties, as well as vaccines and seedlings. A large number of producers used mixed agricultural technologies, accounting for 89% of urban agriculture entrepreneurs in the study towns. They used combination of improved agricultural technologies with traditional agriculture facilities. The majority of urban agriculture producers lacked the skilled labor required to operate modern agricultural technologies, but they hope to improve more through training and experience sharing. About 22% of urban agriculture producers used skilled labor to operate agricultural technology (Table 8). The skilled labor required to operate improved agricultural technologies differed between Ambo and Waliso towns, which was statistically significant at the 5% probability level.

Table 8. Types of agriculture technologies practiced in Ambo and Waliso urban agriculture, 2021

Descriptions	Ambo		Waliso		Overall		χ2	P _value
	n	%	n	%	n	%		
Types of facility/agriculture technology the agriculture using								
Traditional	3	12	3	8	6	10		
Improved	1	3	0	0	1	2	1.703	0.427
Mixed	22	85	34	92	56	89		
Skilled labor to operate the technology	9	35	5	14	14	22	3.934	0.047**

Source: Survey results, 2021

Agriculture producers in Ambo and Waliso towns sold urban agriculture products to customers at farm gates (32%), houses (27%), shops (17%) and market centers (16%). Thus, the products of urban agriculture are sold to buyers at various points throughout the towns. Fattened animals, vegetables, and seedlings were sold to market centers. Contract sales were the primary way to market milk in towns. They sold milk to institutions and individuals directly. The eggs were sold to residents, restaurants, hotels, and retailers in the study towns. In Ambo and Waliso towns, consumers (62%) were the primary buyers

of urban agriculture products, followed by traders (21%), and retailers (17%). Urban agriculture producers sold products to both regular and irregular customers. Customers who purchased urban agriculture products were both regular and irregular (Table 9). The price of urban agriculture products is determined by producers (60%) based on feed costs and other agricultural expenses. In the study area, the market (demand and supply) determined by 38% of urban agriculture products. To promote their products, urban agriculture producers used noticeboards with phone numbers, paper distribution, and individual communications. They were creating demand for their products through promotion and one-on-one information sharing. Some urban agricultural producers generated demand for their products through regular customers and market centers.

Table 9. Marketing of urban agricultural products

Marketing of urban agricultural products	Ambo		Waliso		Overall		χ2	P _value
	n	%	n	%	n	%		
Market places								
Agriculture gate	8	31	12	32	20	32		
Home	6	23	11	30	17	27		
Market center	6	23	3	8	9	14	4.238	0.375
Hotels/restaurants and institutions	1	4	5	14	6	10		
Shops	5	19	6	16	11	17		
Buyers								
Consumers/users	16	62	24	65	40	63		
Traders	6	23	6	16	12	19	0.513	0.774
Retailers	4	15	7	19	11	18		
Customers								
Regular	15	58	26	70	41	65	1.063	0.303
Not regular	11	42	11	30	22	35		
Price determinations								
Producer itself using markup price	15	58	23	62	38	60		
Consumers/buyers	0	0	1	3	1	2	0.959	0.619
Market itself (demand and supply)	11	42	13	35	24	38		

Source: Survey results, 2021

Processing and consumption practices

For urban agriculture outputs, there is a very limited processing mechanism. Households processed urban agriculture outputs (milk) primarily at home during the festive seasons. Only 10% of the sample producers processed their urban agricultural products at home in the study towns (Table 10). The lack of agricultural processing technologies and a lack of skill were some of the major issues associated with the processing and value addition of urban agricultural products in the Ambo and Waliso towns. Family members consumed urban agriculture products at home. However, some urban agriculture producers did not consume their agricultural outputs because they preferred money over use at home, and others may have done so due to product limitations with contract agreements for supplying their customers. Agriculture households consumed around 75% of urban agriculture products at home (Table 10). Consumption is determined by the size of the family (household members living with agriculture producers) and the type of agriculture products. As a result, consumption trends of agricultural producers' products are increasing, except during the year's fasting period. Agricultural products were consumed as usual or regular food items by the producers in the study towns.

Table 10. Processing and Consumption of urban products in Ambo and Waliso towns, 2021

Descriptions	Ambo		Waliso		Overall		χ2	P _value
	n	%	N	%	n	%		
Value addition/processing	5	19	1	3	6	10	4.841	0.028**
Consumption of urban agriculture products	21	81	27	71	48	75	0.777	0.378

Source: Survey results, 2021

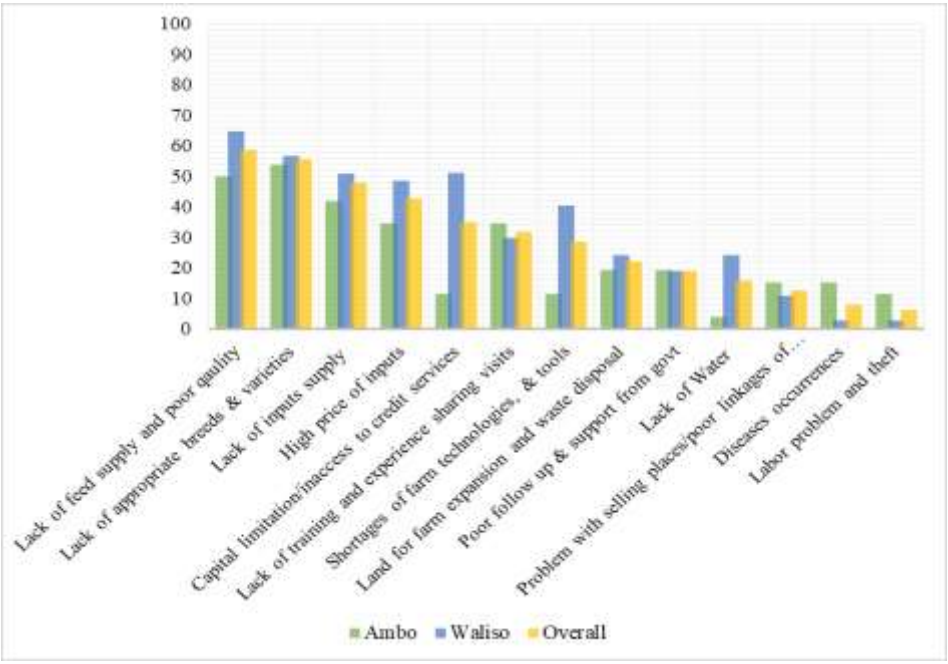
Partnerships and policy support

Advisory services, visiting, technical assistance, vaccination, and veterinary services were mostly provided to urban agriculture producers in Ambo and Waliso towns by various organizations. The primary organizations that supported urban agriculture were agricultural offices by providing artificial insemination technical services and agricultural extension services. Some non-governmental organizations (NGOs) provided training, financial support, and material assistance for urban agriculture producers. Organizations such as Ambo University, Ambo Agricultural Research, and urban administrative agricultural offices were given assistance for improving the urban agriculture.

Challenges and Opportunities of urban agriculture

Challenges of urban agriculture

Urban agriculture is a relatively new development target comes up with both opportunities and challenges. The main problems identified in the Ambo and Waliso towns were inadequate feed supply and poor quality, a lack of appropriate agricultural technologies (poultry and dairy breeds, seeds, seedlings, forages), too much high price of agriculture inputs, capital sources (inaccessibility to capital and credit services), a lack of training and experience sharing visits to bridge skill gaps, and shortages of improved agricultural technologies and farm tools. There were also shortages of inputs (polythene bags, medicines, vaccines, AI services), poor follow-up and support from respective government organizations, inadequate water supply poor linkages between actors and selling places for urban products, disease occurrences (death of calves and cows), labor problems, and theft in the study towns.



Source: Survey results, 2021
Figure 2. Major constraints of urban agriculture in Ambo and Waliso towns (%)

Opportunities available

Urban agriculture has different best opportunities for the existed and newly interested to establish the agriculture activities in the towns. Availability of users and better market for urban products (milk and eggs) are some of the opportunities for urban agriculture producers. Thus, high users/consumers of products (market demand for urban agriculture products and interest for the sectors), more profitability of sectors with low investments, and high demand for practicing agricultural technologies (dairy and chicken) were attracting agriculture businesses. Opportunities in urban agriculture were summarized as:

Urban agriculture provides various best opportunities for existing and newly interested farmers to establish agriculture activities in towns. Some opportunities for urban agriculture producers include the availability of users and a better market for urban products (milk and eggs). Thus, high users and consumers of products (market demand for urban agriculture products and interest in the sectors), higher profitability of sectors with low investments, and high demand for practicing agricultural technologies (dairy and chicken) were attracting agriculture businesses. The following are some of the opportunities in urban agriculture:

- A better market for products (milk, chicken and eggs) with close users in towns.
- It provides employment opportunities for jobless youths and women in the towns.
- Generates additional income for urban agricultural producers.
- The Ethiopian government has recently emphasized and supported urban agriculture.
- Good weather conditions (favorable environment for urban agriculture) in Ambo and Waliso towns.

To capitalize on the opportunities identified, the actors and enablers involved in urban agriculture should focus on providing improved technologies to meet domestic agricultural products demand. Facilitate credit services for agricultural production, as well

as technical assistance from experts and institutions through training, and improved management practices.

Conclusions and Implications

This study was aimed to evaluate the different types of urban agriculture, technology use practices, their role in improving the livelihood of producers, and challenges related to urban agriculture. Various agricultural technologies have been introduced to boost production and productivity in urban agriculture, but only a few improved technologies have been adopted by producers. This could be due to incompatibility of developed agricultural technologies and their inaccessibility to urban agriculture producers with affordable means. Many factors limit the use of technology and the expansion of urban agriculture in Ambo and Waliso towns. The study identified major challenges such as animal feed supply shortages, a lack of agriculture technologies and facilities, a lack of agriculture inputs, a lack of credit, limited institutional support for urban agriculture, a lack of training and experience sharing, limited AI and veterinary services, and the prevalence of disease that affect the practice of urban agriculture. Furthermore, producers in urban agriculture do not widely adopt improved agricultural technologies due to unavailability of appropriate agricultural technologies, a lack of awareness, and inadequate extension services. The study also revealed that urban agriculture improves producers' financial and social capital. Urban agriculture enabled producers to supplement their family's income while also serving households as a good source of food derived directly from urban agriculture. It contributes to the creation of job opportunities for unemployed household members (both men and women). To address the challenges and expand urban agriculture in the study towns, urban agricultural offices should be provided training and supplied appropriate agricultural technologies. Thus, respective stakeholders play their roles by promoting technologies to support urban agriculture, providing training and technical assistance, supplying input such as feed and animal medicines, and making financial institutions available to credit service urban agriculture. Concerned stakeholders should get involved in developing and implementing appropriate agricultural technologies for urban agriculture producers. Promoting the adoption of improved agricultural technologies that increase the production and productivity of urban agriculture is critical. With the right combination of infrastructure, agriculture facilities, training, extension services, and credit services, appropriate technology use leads to better improvements in the livelihoods of urban agriculture households As a result, it is suggested that developing appropriate agricultural technologies, increasing access to improved agricultural technology, raising awareness of technology use, and closing skill gaps are better ways of integrating technology in urban agriculture for widespread adoption of improved technologies. The study's findings led to the following recommendations:

- Research institutions should play a vital role in generating appropriate agricultural technologies best suited to urban agriculture conditions.
- Access to credit services for urban agriculture households should be prioritized along with creating awareness about agricultural productivity-boosting technologies. As a result, improved dairy and poultry technology dissemination should be provided to urban producers in credit for those who cannot afford the price.
- Women and youths play a significant role in urban dairy and poultry agricultural practices, and the agricultural technologies should be targeted to these groups.

- Feed inadequacy has remained the most significant constraint to dairy and poultry production in urban agriculture. The provision of improved forage technologies and feed supply is critical to ensuring production and productivity in the sectors.
- To encourage the use of improved agricultural technologies, agricultural tools, vaccines, and medications should be supplied at affordable price for urban producers. It is important to provide various agricultural technologies at reasonable prices and make them available to urban agricultural households.
- It is critical to organize training, field visits, and experience sharing to increase urban agriculture producers' awareness and knowledge of improved agriculture technologies. Furthermore, training with practical demonstrations on improved technologies practices and production packages should be organized to increase awareness among urban agriculture producers.
- Attention should be given to artificial insemination services in order to increase dairy technology adoption for cows breeding practices.

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