Husbandry Practices, Farmers' Perception and Constraints of Pig Farming in Bishoftu and Holeta Areas, Central Ethiopia

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Abstract: The study was conducted to describe and compare the current pig production practices in Bishoftu and Holeta towns and their surroundings, central Ethiopia. The areas were selected since they are the most important pig production areas in the country. A structured questionnaire was used to interview 20 and 23 pig farmers from Holeta and Bishoftu, respectively. The parameters studied in the survey included socio-economic characteristics, production and management, ownership, herd structure, purpose of keeping, feed resource, feeding and fattening practices, reproductive management, meat utilization and marketing, and pig production constraints. Results indicate that household characteristics of pig keepers did not differ significantly ($P > 0.05$) between the two study areas. Pig farmers keep adapted exotic pig breeds. Herd composition did not differ statistically ($P > 0.05$) between the two study areas. Mean pig herd size per household was 5.72. The majority (58%) practice both pig breeding and fattening. The two study areas were similar ($P > 0.05$) in the type of pig house. Pigs were permanently housed by 88.4% of the households. Major feed sources offered to pigs in both study areas include household wastes, market wastes and crop residues. Reproductive managements did not differ significantly ($P > 0.05$) between the two study areas. Similar results ($P > 0.05$) were obtained for origin of animal stocks in the two study areas. Most (83.7 %) of the farmers acquired their foundation stock from local markets. The farmers did not slaughter pigs for home consumption and pigs were kept as a source of income. Farmers in both study areas named high cost of feeds, followed by pig mortality due to diseases, marketing constraints and lack of capital as major constraints for pig production. Despite the existence of production constraints, most respondents had aspiration to continue rearing pigs and plan to expand pig farm. It can be concluded that an improvement of pig production in Central Ethiopia should consider an improvement in feeding practices, marketing system, prevention of diseases, and a reduction of inbreeding.

Keywords: *Feed sources, Households; Pig farming; Husbandry practices; Small scale*

Introduction

Pigs are considered as the only litter-bearing animal among meat producing livestock having the shortest generation interval and high feed conversion efficiency. Pig production forms an integral part of farmer's economy in many parts of the world, and plays enormous role in poverty reduction by creating employment opportunities for resource-poor farmers. Consequently, pig production is increasing from time to time in many parts of tropical countries (Serres, 2001). In the tropics pigs have been raised under various husbandry practices including free range feeding, tethering, and confinement (Kimbi *et al.*, 2001). Traditionally kept pigs contributes about 80% of pigs kept in East Africa (Tanzania, Kenya and Uganda), 75% in Zimbabwe, 70% in Botswana (Setschewaelo, 1992), 65% in Sahel countries (Chad, Niger, Mali, Guinea Bissau, Senegal), and 80% in Namibia (FAO, 1998).

Ethiopia's pig production is concentrated in limited areas and the population is estimated at about 33,000 (FAOSTAT, 2013). To date, the pig production in the country has received very little attention and no systematic documentation of farming practices has been done (Seid and Abebaw, 2010; Theodros *et al.*, 2013; Yeshambel and Bimrew, 2014). To formulate policies, improve pig production and to increase the income of the pig farmers, farming practices should be evaluated. Grass root-level surveys are needed in order to obtain farmers' perceptions on the pig production and feed utilization. Such approach will certainly help to generate appropriate technologies within the prevailing conditions of the different pig farming areas. There is, therefore, an increasing need to technically assess the problem at the ground level and identify ways of overcoming constraints to improve pig production in the country. The main objective of the current study was therefore, to generate and avail information on purpose

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of keeping, management practices, meat utilization, marketing, and production constraints of pigs in two study areas of central Ethiopia.

Materials and Methods

Description of the Study Areas

A survey was conducted within and around Bishoftu and Holeta towns. These were selected since they are the most important pig production areas. Bishoftu is located in the central highlands of Ethiopia at about 45 km southeast of Addis Ababa and its geographic location is at 8°45'00" N latitude and 38°59'00" E longitude. The area has an altitude of about 1900 meters above sea level, with average annual rainfall of 849 mm. The average minimum and maximum temperature ranges from 10.5 to 26.1°C with a mean value of 18.7°C. The average relative humidity is 58.6% (DZARC, 2001). Holeta is located at 40 km distance west of Addis Ababa and its geographic location is at 9°04'00" N latitude and 38°30'00"E longitude. It lies at an altitude of 2400 meter above sea level. The average minimum and maximum temperatures are around 6.1 and 24°C, respectively. The annual rainfall of the area is 1250 mm.

Data Collection

A rapid field visit was conducted before the data collection to get information about the study area and help to select pig farmers. Based on the assessment of the rapid field visit and in consultation with regional Ministry of Agriculture offices, pig farms within the towns and small scale farms around the towns were purposively selected based on their pig production potential, experience in pig farming and access to market. Households that have at least two pigs or landless farmers who have a minimum of one year experience in pig production were included for the study. Structured questionnaire was used to collect information from all households who own pigs. Interview was made for each respondent with the help of trained enumerators. Secondary information was also collected from development agents and experts of livestock working in the towns/districts. Based on information on pig husbandry, management practices and farmers' perception about piggery in the region, prospects and constraints were assessed to draw recommendations.

In general, the aspects covered in the farm questionnaires included farm-management practices, type of feeds and feeding practices, housing, reproduction, marketing and utilization of pig's meat, and production constraints encountered in pig production. General information on the socio-economic characteristics of the respondents such as family size, age, education, sex, occupation, farm size, household size, etc. were also collected. Production and management practices such as housing, herd structure, purpose of keeping, feed resources, feeding practice and fattening practices were also included in the study. Reproductive parameters included in the survey were breeding/mating system, methods of mating and weaning. Furthermore, information on meat consumption, buying and selling of animals, and on main constraints as they are perceived by farmers were collected.

Data Processing and Analysis

Data from the questionnaire was entered into SPSS (2007) database and validated for analysis. After validation, the data were analyzed using SAS (2004) statistical package. Descriptive statistics was employed for data involving frequencies and Pearson chi-square was used to compare variables between the two areas, whereas quantitative variables were analyzed using analysis of variance procedure. Indices were calculated to provide overall ranking of a particular trait according to the formula: Index = sum of [4 for rank 1 +3 for rank 2 +2 for rank 3 +1 for rank 4] given for an individual trait divided by the sum of [4 for rank 1 +3 for rank 2 +2 for rank 1 +1 for rank 4] summed over all traits.

Results and Discussions

Characteristics of Pig Keepers

Characteristics of pig farmers did not differ between the two study areas (Table 1). Male headed households were the majority involved in pig husbandry. This is similar to that has been reported earlier in other traditional production systems (Nsoso *et al*., 2006; Nwanta *et al.,* 2011; Riedel *et al*., 2012; Nath *et al.,* 2013; Ikwap *et al*., 2014). But, it is in contrast with the report in Kenya (Mutua, 2010), Zimbabwe, and South Africa (Halimani *et al.,* 2013; Chiduwa *et al.,* 2008) where pigs are traditionally owned by women. In Southern Africa also, females played a bigger role in pig farming (Madzimure *et al.,* 2013). The present study revealed that a high proportion of middle aged and small proportion of young household heads were involved in pig production. This is in agreement with the findings of Ajala *et al.* (2007). About 46.5% of the respondents had finished secondary school and higher education (Table 1). This is in agreement with the findings of Yeshambel and Bimrew (2014) and Theodros *et al.* (2013). The highest percentage of the respondents having formal education also agrees with the observations of Adesehinwa *et al.* (2003) who reported that a higher percentage of pig farmers in Oyo State of Western Nigeria had formal education. In the current study, the high level of education amongst the pig farmers could help them to implement good husbandry and health-management practices to enhance pig productivity. On average respondent farmers had 9.73 years of experiences in pig husbandry indicating the presence of better know how in pig keeping in the present study area. This is in contrast with the findings of Yeshambel and Bimrew (2014) who reported pig keeping to be a recent introduction in Northwestern Ethiopia. More than half (53.5%) of the respondents' in the study areas are full-time government employees who engaged in business and pig farming to earn additional income.

Such findings have also been reported in other countries in Africa and Asia (Kagira *et al*; 2010, Costales *et al*., 2007; Lemke *et al.,* 2006).

In the study areas farmers keep adapted exotic pig breeds. This is similar to that reported in a mountainous area of Northeast India (Kumaresan *et al*., 2009). But, this is in contrast to other previous reports where the majority of the farmers who kept or prefer local or crossbred pigs (Kagira *et al.,* 2010; Patr *et al.,* 2014; Madzimure *et al*., 2013; Nath *et al.,* 2013; Fualefac *et al.,* 2014). This is also in contrast to reports that indicated most of the pigs raised in developing countries are crosses or local breeds raised under traditional production systems (Permin *et al.,* 1999; Hide, 2003; Wabacha *et al.,* 2004). Keeping adapted exotic breeds in the present study area may not be a matter of preference, but lack of choice since there are no indigenous breeds or cross breeds in the country.

Livestock Holding

Farmers predominantly own pigs (26.77%) and poultry (30.25%), they also rear other animals such as cattle (17.19%), small ruminants comprising sheep (16.54%) and goats (9.25%). Ownership patterns of other livestock species were similar for the two study areas (Table 2). The majority of the livestock and poultry in the present study are indigenous breeds or their crosses that are managed using traditional practices. Generally, few external inputs are purchased for livestock. The farmers in the present study are smallholder livestock keepers which are similar to report from North Vietnam (Lemke *et al*., 2007).

Table 1. Characteristic of pig owners in the study areas

	Bishoftu (N=20)		Holeta (N=23)			Total (N=43)
Farmer's characteristics	Number	%	Number	%	P-value	Overall %
Sex					0.756	
Male	18	90	20	87.00		88.40
Female	2	10	3	13.00		11.60
Age (years)*	41.85±10.93		39.48 ± 10.45		0.472	40.60 ± 10.62
25-29	3	15	5	21.74		18.60
30-34	4	20	3	13.04		16.28
35-39	2	10	4	17.39		13.95
40-44	3	15	4	17.39		16.28
45-49	2	10	2	8.70		9.30
50-54	3	15	2	8.70		11.63
55-59	2	10	3	13.04		11.63
≥60	1	5	0	0		2.33
Family Size (*n*)*	4.90 ± 2.06		5.1 ± 2.33		0.728	4.98± 2.19
1-5	15	75	14	60.90		67.44
6-10	5	25	9	39.10		32.56
Educational level					0.928	
Never been to school	5	25	4	17.40		20.90
Primary education	6	30	8	34.80		32.60
Secondary education	7	35	8	34.80		34.90
Higher education	2	10	3	13.00		11.60
Primary occupation					0.960	
Full-time employee	5	25	6	26.10		25.60
Farmer	6	30	6	26.10		27.90
business	9	45	11	47.80		46.50
Experience in pig rearing*	8.28±5.39		11.00±5.87		0.122	9.73±5.75
1-5 years	10	50	7	30.43		39.53
6-10 years	4	20	5	21.74		20.93
11-15 years	3	15	3	13.04		13.95
16-20 years	3	15	8	34.78		25.58
Breed (%)					0.00	
Local	0	0	0	0.00		0.00
Large White (Yorkshire)	20	100	23	100		100

*P-value refers to the level of the difference between the proportions from the two study areas; *Mean ± Standard Deviation; N = number of respondents.*

Table 2. Number of livestock owned by pig farmers (mean ± SE) in the study areas

Livestock type	Bishoftu (N=20)	Holeta (N=23)	Total (N=43)	P-value
Cattle	3.50± 0.489	3.83±0.501	3.67±0.361	0.658
Sheep	3.30±0.442	3.74±0.549	3.53±0.356	0.545
Goat	2.20±0.268	1.78±0.301	1.98±0.204	0.313
Poultry	6.00±0.548	6.87±0.556	6.47±0.393	0.275
Pigs	5.25±0.459	6.13±0.551	5.72±0.283	0.501

*N= number of respondents, *Mean ± Standard Error.*

Origin of Pig Stocks

Similar results (P > 0.05) were obtained for origin of animal stocks in the two study areas (Table 3). Most of the farmers acquired their foundation stock from local markets while others got their foundation stock from home bred animals and neighbor herds and less than 10% of the respondents obtained foundation stock from family. Such observation coincide with results of Hossain *et al.* (2011) who reported that farmers in Bangladesh purchased pig from market or neighbors and started a family level farming. This is also similar to that reported in traditional pig farming in Nagaland, India where foundation piglets are mostly acquired from local market (Patr *et al*., 2014).

Table 3. Acquisition Methods of the pig foundation stock

Origin of animal stocks*	Bishoftu (N =20)		Holeta (N =23)			Total (N =43)
	Number	%	Number	%	P-value	Overall %
Purchased	16	80	20	87.0	0.538	83.7
Homebred	6	30	9	39.1	0.531	34.9
Neighbours	5	25	7	30.4	0.692	27.9
Family	2	10	2	8.7	0.883	9.3

P-value refers to the level of the difference between the proportions from the two study areas; **Total observations >100% due to multiple responses; N= number of respondents.*

Herd Structure of Pig

Herd composition did not differ statistically (P > 0.05) between the two study areas (Table 4). The mean herd size was small (5.72) and consisted mostly of sows, gilts and piglets. Most households had less than three sows in their herd and a relatively small number of piglets and only four farmers owned boars. It was recorded that 32.56% of the farmers kept less than 5 pigs and 67.44 % of farmers kept 5-10 pigs in their house. The small herd size ownership is probably associated with availability of land (Katongole *et al.,* 2012). The low herd size observed in this study could also be due to the high cost of feeding. The pressure on land in the highlands of Ethiopia may impose a pressure on livestock feed resources forcing the pig farmers to keep an average herd size of no more than five pigs. This observation is consistent with the findings under small-scale farming system in other countries (Ajala *et al*., 2007; Huynh *et al.,* 2007). The current average herd size was smaller than what has been reported in Democratic Republic of the Congo (Bienvenu *et al.,* 2014), India (Kumaresan *et al*., 2009; De *et al.,* 2014) and higher than reported in Nigeria, northeast India, Zimbabwe (Ajala *et al*., 2007; Patr *et al.,* 2014; Chiduwa *et al.,* 2008) and in western Kenya (Kagira *et al.,* 2010). But it is similar to that reported in North Vietnam (Lemke *et al.,* 2007).

Table 4. Herd structure of pig farms in the study areas

Study area	Piglet Male (0-2m)	Piglet Female (0-2m)	Sub-Adult Male (2-6m)	Sub-Adult Female (2-6m)	Adult Male (>6m)	Adult Female (>6m)	Total	No. of pigs per household
Bishoftu	11	10	15	21	22	26	105	5.25
Holeta	9	13	29	35	22	33	141	6.13
Total	20	23	44	56	44	59	246	5.72
Percentage	8.13	9.35	17.89	22.76	17.89	23.98	100	
SEM	0.126	0.122	0.108	0.171	0.071	0.145		
P-value	0.537	0.793	0.016	0.173	0.316	0.649		

m=months; SEM=standard error mean; p-value refers to the level of the difference between the proportions from the two study areas.

Purpose of Keeping Pigs

The two study areas were similar (P > 0.05) in purpose of keeping pigs (Table 5). Breeding, fattening, and mixed farming were considered as the purpose for keeping pigs in the study areas. Piglets for fattening were purchased from seller or from nearby farmers by 23% of the pig keepers who raised pigs primarily for fattening to sale. About 19% of the pig keepers are breeders keeping sows and are engaged in piglet production. The majority (58%) were mixed farmers that practice both breeding and fattening. Farmers fattened own farm produced offspring, but some farmers bought additional piglets for fattening. This is in agreement with that observed in other smallholder systems (Lanada *et al.,* 2005; Lemke *et al.,* 2007; Mutua *et al.,* 2011; Kagira *et al.,* 2010; Patr *et al.,* 2014).

Table 5. Purpose of keeping of pigs in the study areas

	Bishoftu (N=20)		Holeta (N=23)			Total (N =43)
	Number	%	Number	%	P-value	Overall %
Purpose of keeping					0.693	
Breeding	3	15	5	21.7		18.6
Fattening	4	20	6	26.1		23.3
Mixed/dual purpose	13	65	12	52.2		58.1

P-value refers to the level of difference between the proportions from the two study areas; N= number of respondents.

Housing Practices

In the present study, all the respondents in the study areas provide some form of housing to their pigs. The two study areas were similar (P > 0.05) in the type of pig house. Pigs were permanently housed by 88.4% of the households in a house constructed from mud walls either with thatched or zinc roof, while the rest of the households kept their pigs in temporary pig house in the backyard (Table 6). This practice is similar to that observed in North Vietnam where pigs were permanently penned (Lemke *et al.,* 2007). It is also consistent with pig production in Democratic Republic of Congo where the majority of the pigs were reared in pens without free roaming (Bienvenu *et al*., 2014). Moreover, the majority of the households in North East Indian State of Nagaland housed their pigs all the time (Njuki *et al*., 2010; Patr *et al*., 2014; Nath *et al*., 2013).

Table 6. Type of housing in the study areas

	Bishoftu (N=20)		Holeta (N=23)			Total (N=43)
	Number	%	Number	%	P-value	Overall %
Type of house					0.569	
Permanent house	18	90	20	87		88.4
Temporary house	2	10	3	13		11.6
Shelter					0.498	
Together	14	70	15	65.22		67.4
Separated pen	6	30	8	34.78		32.6

P-value refers to the level difference between the proportions from the two study areas; N= number of respondents.

In the present study very few households partially confined their pigs in temporary pig house/pen. In the temporary type of housing, pigs are housed in wooden or bamboo-made pens that are roofed with tin or locally available materials. This is consistent with the reports of low-input traditional free ranging pig farming system of other developing countries like Kenya (Kagira *et al.,* 2010), Zimbabwe (Chiduwa *et al.,* 2008) and other part of Africa (Madzimure *et al.,* 2013). In this type of housing pigs were allowed to scavenge/graze during day and confined during night time. In Northeast India (Kumaresan *et al.,* 2009) about 98% of the pig houses were of temporary type and made up of locally available materials. Kumaresan *et al.* (2009) also noted that permanent type of housing is more in urban areas where the exotic pig rearing is highly practiced. In other developing countries like Kenya and Nigeria, tethering of free-range pigs was undertaken during the rainy season since pigs were predisposed to damaging of crops (Mutua *et al.,* 2012; Ajala *et al*., 2007).

In the present study area, farmers use similar (P > 0.05) housing management. About thirty-three percent of the households had separated fattening and maternity pens, while the rest sheltered their pigs together. Thirty-three percent of the pig house had concrete floors, and are cleaned regularly, while the rest were earthen floors. Majority (92%) of the pig farms had mud walls either with thatched or zinc roof. The floor space per animal was found to be adequate in 92.98% of the farms. Recommended pig housing system was not found in the present study areas, and pigs were kept together regardless of their age, sex and reproduction status.

Feed Sources and Feeding System

The major feed sources that were offered to pigs by farmers in the present study area include household

wastes, market wastes and crop residues (Table 7). A large proportion of residues from cereal crops like maize, sorghum and millet which are available from households and unsuitable for marketing and family use are utilized as pig feeds. The market wastes varied from hotel wastes, potato peelings, fruits/vegetables and slaughter house wastes including blood and offal. Feeding household and market wastes and crop residues to pigs of all categories is a means of reducing feed cost. Generally utilization of commercial feeds for pigs was limited in the study areas. This is similar to what has been reported in other traditional production systems (Nsoso *et al.,* 2006; Lemke and Zarate, 2007; Kagira *et al,* 2010; De *et al,* 2014). The system of raising pigs on locally available resources has been reported in Northeast India (Kumaresan *et al*., 2009) and in North Vietnam (Lemke *et al*., 2006).

Table 7. Major pig feed sources in the study areas

Feed sources	Bishoftu (N =20)		Holeta (N =23)			Total (N =43)
	Number	%	Number	%	P-value	Overall %
Household wastes	15	75	16	69.6	0.692	72.1
Market wastes	13	65	15	65.2	0.988	65.1
Crop residues	13	65	14	60.9	0.780	62.8
Purchased feeds	2	15	2	8.7	0.520	11.6
Grazing	2	10	3	13	0.756	11.6

Percentages exceed 100% within a column due to multiple responses; P-value is a chi-square probability; N= number of respondents.

In contrast to the present study locally available indigenous plant materials (forages) serve as the main feed for pigs in other pig dominated states of India like the northeast part of Sikkim Himalayan region (Nath *et al*., 2013) and Nicobar group of islands (De *et al.,* 2014) as well as in other developing countries like Kenya (Mutua *et al*., 2012), Zimbabwe (Halimani *et al.,* 2013) and Democratic Republic of Congo (Bienvenu *et al.,* 2014). In this study, poor-quality feeds and inadequate feeding are mentioned to be the major factors limiting pig productivity, which needs to be addressed to enhance productivity and income from pig production.

Higher percentage of farmers (88%) practiced group-feeding inside the pen. Very few farmers (12%) allow their pigs for scavenging. Almost all farmers (98.1%) used local feeders, made up of wooden board or concrete for feeding pigs. Other materials used as feeder and waterer were cut tier of vehicles and aluminum plates.

Reproductive Management

Natural service is the only breeding method used by producers in the study areas (Table 8). This is in contrast to the practice in other tropical smallholder farms (Gatenby and Chemjong, 1992; Lanada *et al.,* 1999; Lemke *et al*., 2007) where sows are served by artificial insemination. The pig farmers recognized oestrus from the behavior of the sow based on standing reflex and by using boar. Heat detection techniques identified in this study coincided with results of Losada *et al.* (1997) who reported that majority of the farmers in east of Mexico city detected heat from the behavior and external changes in the reproductive organ of the sows.

Mean litter sizes in the present study was markedly low (6-7) which are in conformity with the report of Hossain *et al.* (2011) in Bangladesh and Chiduwa *et al.* (2008) in Zimbabwe. The average number of piglets per litter in commercial farms in Kenya was 8 (Wabacha *et al*., 2004). The small litter size reported in this study can be attributed to poor diets and inbreeding (Toro *et al.,* 1988). Inbreeding is a major issue in indigenous pig population for declining productivity (Patr *et al*., 2014). Majority of the sows in the current study farrowed twice a year, which is similar to the expected farrowing index of about 2.2 (Chiduwa *et al.,* 2008).

In the surveyed areas, the majority of farmers (81.4%) castrated their pigs at the age of 3-4 months using surgical method. This is similar to that reported in other traditional production systems (Nwanta *et al.,* 2011; Nath *et al.,* 2013). Farmers perceived that growth of the castrated pigs is better than the uncastrated ones. However, piglets with better vigor, body weight and health are kept uncastrated for breeding purpose.

Majority of the farmers (86%) practiced pig weaning at 60 days and above. Delayed weaning of pigs was observed on majority of the farms which is similar to that reported in Kenya (Mutua *et al.,* 2011; Kagira *et al.,* 2010), Zimbabwe (Chiduwa *et al.,* 2008) and Creole piglets in Guadeloupe (Gourdine *et al.,* 2006), in Nepal (Gatenby and Chemjong, 1992) and the Solomon Islands (de Fredrick and Osborne, 1977). Early weaning is, however, not ideal for smallholder farming areas as the practice should be supported by suitable and sustainable feeding regimes.

Consumption and Marketing

The pig farmers in the study areas did not slaughter pigs for domestic consumption. This is because the majority of the communities are Orthodox and Muslims religion followers who do not consume pork since it is forbidden by the religion. As a result, farmers reared pigs mainly as a source of income. Earlier studies in other parts of the country also indicated that all respondents keep pigs entirely as a means of income generation (Theodros *et al*., 2013; Yeshambel and Bimrew, 2014). This is also similar to what has been reported in Western Kenya

(Kagira *et al.,* 2010) where pigs are mainly kept as source of income. In other countries, low-input pig production has role of both income- generation and source of meat for home consumption (Ajala *et al.,* 2007; Lemke and Zarate, 2007; Patr *et al.,* 2014). In other African countries smallholder pig production is primarily for market (Ajala *et al.,* 2007; Kagira *et al.,* 2010; Bienvenu *et al.,* 2014) and consumption of animal products come only secondary. This lies in contrast with Asian areas where pigs are less market oriented but fulfill functions related to savings and household consumption (Kumaresan *et al.,* 2009; Lemke *et al.,* 2006).

According to respondents, there are no central markets for trading live pigs. Smallholder pig farmers use different marketing channels. From the farmers, the animals have to pass through several middle men before reaching direct consumers. Some pig farmers sell live pigs to agents or traders who come to collect them in villages. Pigs are also traded at the super market in Addis Ababa based on a negotiated price between the farmer and super market owner. The pig price paid to farmers is based on live weight, sex and age of the pig through negotiation implying that farmers have little influence on the price.

Table 8. Reproductive management of pigs in the study areas

Parameters	Bishoftu (N=20)		Holeta (N=23)			Total (N=43)
	Number	%	Number	%	P-value	Overall %
Heat detection method					0.265	
Boar	9	45	6	26.1		34.9
Standing reflex	6	30	6	26.09		27.9
Boar + standing reflex	5	25	11	47.8		37.2
Methods of mating					0.637	
Live boar	16	80	17	73.9		76.7
AI	0	0	0	0		0
Never use boar or AI	4	20	6	26.1		23.3
Farrowing frequency per year					0.775	
Twice	14	70	17	73.91		72.1
once	6	30	6	26.09		27.9
No of piglet per farrowing					0.971	
<6	2	10	2	8.70		9.3
6-10	15	75	17	73.91		74.4
>10	3	15	4	17.39		16.3
Castration					0.571	
Yes	17	85	18	78.3		81.4
No	3	15	5	21.7		18.6
Weaning age					0.597	
Two months	3	15	3	13		14
>two months	17	85	20	87		86

P-value refers to the level of the difference between the proportions from the two study areas; N= number of respondents

Constraints of Pig Production

Lack of feeds, disease risks, marketing problem and shortage of financial sources were mentioned as the main constraints to intensify pig production (Table 9). Feed ranked to be the first limiting bottleneck for pig production as perceived by farmers. The major feedstuffs available for pig production are of low quality, which do not meet their productive and reproductive performances. In both study areas, the price of concentrate feed is high and unaffordable to the pig farmers. Diseases were the second major constraints of pig production in the study area. The main disease constraints were diarrhea (39.5%), mange (37.2%), cough (20.9%), and worms (2.3%) which can lead to pig mortality. Marketing was equally reported by seventy percent of the farmers as a problem for pig production in the study areas. Quite a lot of farmers reported lack of collaterals to access bank loans as a factor that limits expansion of their enterprises.

Table 9. Ranking of the major problems of pig production in the study areas

Problems	Bishoftu (N =20)		Holeta (N =23)	
	HH	Index	HH	Index
High cost of feeds	17	0.19	22	0.43
Diseases	16	0.13	16	0.28
Marketing problem	14	0.08	16	0.22
Lack of capital	10	0.06	10	0.07

HH =number of household respondents ranking constraints; N= number of respondents.

Perception of Farmers toward Pig Production

Most respondents expressed the desire to increase their pig holdings. Majority of pig farmers showed interest in continuing pig production. Most respondents have also the plan to expand pig husbandry (Table 10). However, production constraints have been mentioned to have a drawback on their plans. Pigs often die from poor husbandry practices. Therefore, attention should be given to the sector to develop and make the sector better contribute to the livelihood of the smallholders.

Table 10. Tendency of households to continue pig rearing and expand pig farm

	Bishoftu (N=20)		Holeta (N =23)			Total (N=43)
	Number	%	Number	%	P-value	Overall %
Continuing rearing pig					0.747	
Yes	16	80	19	82.6		81.4
No	2	10	3	13		11.6
Not decided	2	10	1	4.3		7.0
Total	20	100	23	100		100
Expanding pig farm					0.765	
Yes	12	60	15	65.2		62.8
No	1	5	2	8.70		7.0
Not decided	7	35	6	26.1		30.2
Total	20	100	23	100		100

P-value refers to the level of the difference between the proportions from the two study areas; N= number of respondents.

Conclusion and Recommendations

This study revealed the emergence of small scale piggery in the central Ethiopia using family labor and locally available feedstuffs. The study identified pig production to have a great potential to enhance household income. However, for better income contribution of pig production, attention should be given to curb the prevailing constraints of feeds and feeding, health and marketing. Detail studies are required to understand accessibility of sufficient customer for pork and market out let.

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Conflict of Interests

The authors declare that they have no competing interests.

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