

Socioeconomic and Farm Characteristics of Small Scale Intensive Pig Production in East Shewa of Central Oromia, Ethiopia

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Abstract: The aim of this research was to investigate the socio-economic profile, farm characteristics and management practices of small scale intensive pig production in east Shewa of central Oromia, Ethiopia where scientific intervention could be initiated for further improvement in production. In this study structured questionnaire administered to a total of 105 household pig farmers, randomly selected from three towns (Addis Ababa, Bishoftu and Adama) in east Shewa. The data generated included socio-economic profile (age, sex, family size, land size, educational level, farming experience in years, source of income and wealth status) farm characteristics (type of breed, labour, working hour, herd size, source of foundation pig) and management practices of pig production. The results indicated that the mean farm experience in years per household was higher ($P<0.05$) in Bishoftu town than in Addis Ababa and Adama towns. The mean farm size in hectare per household was higher ($P<0.05$) in Bishoftu than in Addis Ababa and Adama. A higher ($P<0.05$) percentage of wealthy households were detected in Bishoftu (65%) compared to households in Addis Ababa (48.6%) and Adama (33.3%). Average number of pigs per household was significantly higher ($P<0.05$) in Bishoftu than in Addis Ababa and Adama. Significantly higher ($P<0.05$) percentage of households in Bishoftu (22.5%) employed the recommended housing designs for pigs compared to households in Addis Ababa (5.7%) and Adama (6.7%) towns. Brick walled housing was utilized by significantly higher ($P<0.05$) percentages of respondents in Bishoftu district (30%) compared to Addis Ababa (11.4%) and Adama (10%) towns. Thus, scientific interventions should be designed and implemented accordingly to transform the small scale pig farming in to a profitable enterprise.

Key words: Small scale • Intensive production • Housing • Socio-economic characteristics • Pig

INTRODUCTION

The dietary protein consumption of Ethiopia is estimated at 56 g/person/day (FAO, 2010) which is lower than the average dietary protein consumption of the world (85 g/person/day), developed countries (104 g/person/day) and developing countries (80 g/person/day). Likewise, it is at the same level as the dietary protein consumption of Africa (62 g/person/day) as well as low-income food-deficit countries (57 g/person/day) [1]. The low protein consumption is partly due to the high cost of animal protein sources such as meat of cattle, goat, sheep and poultry.

Ethiopia is the second-most populous country in Sub-Saharan Africa with a population of 96.5 million and population growth rate of 2.5% in 2014 [2]. It is, therefore, necessary to search for a cheaper alternative source of protein to meet the ever increasing demand for it. This demand can be met by rearing fast-growing species with efficient feed conversion rates such as pigs [3]. Pig is one of the most prolific and fast growing livestock species that can convert food waste to valuable products [4]. The carcass dressing percentage of (>65%) pigs is also greater than beef and shoats.

An in-depth investigation of the characteristics of the pig farming is essential for introducing any scientific

intervention and to transform the existing pig production system to a profitable enterprise [5]. Although one report exists on pig production in central Ethiopia [6], there is presently scarcity of information on socioeconomic profile, farm characteristics and management practices of pig production which might hinder to design intervention strategies that lead to sustainable development of small scale intensive pig producers. Hence, the present study was conducted to appraise the socioeconomic role, farm profile and managements practices of pig production central Oromia of Ethiopia. This research will serve as an entry point to intended use and improvement of pig production systems in Central Ethiopia.

MATERIALS AND METHODS

Description of the Study Area: A survey was conducted in three towns of East Shewa of central Ethiopia, namely: Addis Ababa, Bishoftu and Adama depicting highland, midland and lowland agro-ecologies, respectively. Addis Ababa is situated at 9° N latitude 38°E longitude and average altitude of 2355 meters above sea level; Bishoftu is located at 9°N latitude and 40°E longitudes at an altitude of 1850 meters above sea level; Adama is located at 8°N latitude and 39°E longitude 1400 meter above sea level. The study sites have previously been described in detail [6].

Data Collection Procedure: Data was collected from three towns using pretested structured questionnaires, in depths interviews with small scale intensive pig farmers with the help of enumerators recruited and trained for this purpose under close supervision by the researcher. The questionnaire was administered to a total of 105 randomly selected respondents. The number of household's interviewed in Addis Ababa, Bishoftu and Adama was 35, 40 and 30 respectively. The data for the study were collected during January 2014 to April 2015. Data were collected on socioeconomic profiles of the respondents (family size, educational level, age, years of experience, farm size, source of income and wealth status), farm characteristics (breed type, labour, daily time devoted to pig, herd size and source of stock), management practices.

Focus Group Discussions: Focus group discussions were conducted to validate the information gathered in the course of the questionnaire survey. Choice of participants was made in cooperation with the urban agricultural staff. On average six people (ranging from 4 to 11) involved in the discussion.

Statistical Analysis: ANOVA, Chi-square and descriptive statistics of statistical package for social sciences [7] were used to analyze data in relation to socioeconomic characteristics, farm profiles and management practices.

RESULTS AND DISCUSSION

The socioeconomic characteristics of small scale intensive pig keepers in east Shewa were shown in Table 1. Sex of respondents was not associated with the towns ($p>0.05$). Majority (97.1%) of the respondents were male headed households while 2.9% were female headed households considering the total population size. This may highlight the low participation of female farmers in raising pigs. The low percentage of women involved in pig production than men could be as a result of drudgery, physical and energy demanding as well as capital-intensive nature of investment required by pig production, which discourages women. The predominance of men in swine production observed in this study was in agreement with the findings of Fualefac *et al.* [8], who clarified that men are capable of doing more tedious work which is usually associated with pig farming than the females. The results of the analysis showed that age of pig farmers at the three towns were similar. The average age of the pig farmers was 39.78 ± 2.1 in view of the total population. The average age of pig producers was under 40 years old. This mean age along with farmers may suggest high level of vitality for agricultural activities and play central role in productive enterprises [9]. Furthermore, it is in agreement with earlier findings Ajala *et al.* [10] and Duniya *et al.* [11], who reported that farmers were within an economic active age (under 40 years old), making positive contribution to agricultural production. The mean family size across the towns were not different ($p>0.05$) from each other. The overall mean family size per household in the studied towns was 3.14 ± 0.352 people. This result was lesser than the average family size (4.7 people) of Ethiopia [12]. The smaller family size of the current study might be related to the high educational status, which might improve family plan among the pig farmers.

Pig rearing experiences of farmers were different ($P<0.05$) across the study sites. The mean farm experience of respondents was significantly higher in Bishoftu (10.3 ± 1.032 years) compared to respondents in Addis Ababa (5.1 ± 0.494 years) and Adama (3.3 ± 0.547 years), respectively. It seems that Bishoftu farmers commenced raising pigs earlier than Addis Ababa and Adama. Most farmers had experience in pig production which might

Table 1: Socioeconomic characteristics of small scale intensive pig production in east Shewa

Characteristics	Districts				Test	
	Addis Ababa	Bishoftu	Adama	Total	X ² -value	p-value
	N (%)	N (%)	N (%)	N (%)		
Sex						
Female	1(2.8) ^a	1(2.5) ^a	1(3.3) ^a	3(2.9)	0.043	0.979
Male	34(97.1) ^a	39(97.5) ^a	29(96.7) ^a	102(97.1)	0.043	0.979
Educational level						
Junior	9(25.7) ^a	10(25) ^a	8(26.7) ^a	27(25.7)	0.025	0.988
Senior	10(28.6) ^a	11(27.5) ^a	8(26.7) ^a	29(27.6)	0.030	0.985
University	17(48.6) ^a	19(47.5) ^a	14(46.7) ^a	50(47.6)	0.024	0.988
Source of income						
Salary	2(5.7) ^a	2(5) ^a	2(6.7) ^a	6(5.7)	0.888	0.957
Pension	3(5.7) ^a	3(7.5) ^a	2(6.7) ^a	8(7.6)	0.085	0.959
Sell of livestock	4(11.4) ^a	4(10) ^a	3(10) ^a	11(10.5)	0.051	0.975
Various combinations	27(77.1) ^a	31(77.5) ^a	23(76.7) ^a	81(77.1)	0.007	0.997
Wealth status						
Poor	11(31.4) ^a	3(7.5) ^b	18(60) ^a	32(30.5)	22.323	0.000
Medium	7(20) ^a	11(27.5) ^a	2(6.7) ^a	20(19)	4.856	0.088
Welloff	17(48.6) ^a	26(65) ^b	10(33.3) ^a	52(50.5)	6.953	0.031
					Test	
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ±SD	F-value	p-value
Age in years	39.63±1.72 ^a	39.85±2.1 ^a	39.87±2.0 ^a	39.78±2.1	0.16	0.850
Family size	3.14±0.355 ^a	3.13±0.4 ^a	3.17±0.4 ^a	3.14±0.352	0.118	0.889
Farm experience in years	5.1±0.494 ^a	10.3±1.032 ^b	3.3±0.547 ^c	6.6±3.079	809.04	0.000
Land size in hectares	1.2±0.646 ^a	4.5±1.28 ^b	1.2±0.568 ^a	2.5±1.85	156.6	0.000

N (%) depicts number or percent of respondents; SD refers to Standard Deviation; ^{a,b} numbers connected by different letters are statistically significant

improve their productivity and expand their activities bearing in mind the total population size. Farming experience could generally be correlated with attainment of improved skills in agriculture. Accumulated field experiences may tend to tailor farmers choices of feedstuffs, feeding standard and breed of pigs among others away from official standards approved for tropical environment. The overall farming experience for the present study agreed with the findings of Adesehinwa *et al.* [13]. There were differences ($P<0.05$) in farmers land size along with the three towns. The mean farm size was significantly larger ($P<0.05$) in Bishoftu (4.5 ± 1.28) than in Addis Ababa (1.2 ± 0.646) and Adama (1.2 ± 0.568). The present variation in land size might be related to the nature and land allocation system of the three regions. Education level of respondents was not associated with the study sites ($P>0.05$). As regards to total educational level, 47.6% were university, 27.6% senior and 25.7% junior levels. This indicates that

majority of the respondents were found in a better level of education. The high level of education may be attributed to the quick expansion and development of universities and colleges in Ethiopia that could be important to the farming community. This could also ease the acquisition of scientific information and uptake of new technologies on pig husbandry and production aspects. The relative high level of literacy among the districts might enhance innovativeness of the farmers. Additionally, it may assist to extension officers for easy communication and understanding of extension message, especially for application of new technology in swine production and management. This conformed to previous reports of Zanu *et al.* [14], who indicated that there was high level of education among the pig producers in Ghana. However, the current results disagreed with reports of Birhan *et al.* [15] who stated that majority of the pig farmers in Gonder, Ethiopia were illiterate.

Table 2: Characteristics of small scale intensive pig farms in east Shewa

Characteristics	Districts				Test	
	Addis Ababa	Bishoftu	Adama	Total	X ² -value	p-value
	N (%)	N (%)	N (%)	N (%)		
Breed						
Cross	48(100)	57(100)	30(100)	105(100)	-	-
Sources of labor						
Mother	4(11.4) ^a	4(10) ^a	3(10) ^a	11(10.5)	0.051	0.975
Father	7(20) ^a	8(20) ^a	6(20) ^a	21(20)	0.000	1.000
Children	6(17.1) ^a	7(17.5) ^a	5(16.7) ^a	18(17.1)	0.008	0.996
Hired	18(51.4) ^a	21(52.5) ^a	16(53.3) ^a	55(52.4)	0.024	0.988
Sources of parent stock						
Neighbor	30(85.7) ^a	34(85) ^a	26(86.7) ^a	90(85.7)	0.039	0.981
Others	5(14.3) ^a	6(15) ^a	4(13.3) ^a	15(14.3)	0.039	0.981
					Test	
	Mean± SD	Mean± SD	Mean± SD	Mean± SD	F-value	Mean±SD
Working hour	7.06±0.236 ^a	7.1±0.304 ^a	7.07±0.3 ^a	7.07±0.3	0.64	0.529
Herd size	21.1±4.54 ^a	186.53±175.2 ^b	8.5±6 ^a	88.5±136.3	31.0	0.000

N (%) depicts number or percent of respondents; SD refer to Standard Deviation; ^{a,b} values with one superscript letter in common are not significantly separated.

There was no relationship ($p>0.05$) between source of income among the respondents. The intensive pig farmers considered various combinations (77.1%) as their main source of income followed by sell of livestock (10.5%), salary (7.6%) and pension (5.7%) in relation to total population size. Pig farmers that regarded various combinations as their source of earning conducted diverse tasks such as dairying, gardening, meat processing, import and export of different commodities. The diversity in sources of income mirrored the global economic activities of the pig farmers. The current results were in line with the report of Nsoso *et al.* [16].

Wealth status of pig keepers was significantly associated with the study sites ($p<0.05$). Significantly, a higher ($p<0.05$) percentage of wealthy farmers was identified in Bishoftu than in Addis Ababa and Adama. Significantly, smaller ($p<0.05$) proportion of poor pig farmers were detected in Bishoftu compared to in Addis Ababa and Adama. The difference in wealth status might be related to the variation in collection of income by farmers across the study towns. The overall results is in accordance with report of Iyai [17], who noted that large number of farmers had welloff livelihood of farming pigs in Papua and west Papua, new Guinea.

Characteristics of Small Scale Intensive Pig Farms in East Shewa: Table 2 depicts the characteristics of small scale intensive pig farms: breed, labor, working hours,

herd size and source of parent stock. For all herds, the pigs were cross bred considering the total population size. Respondents preferred crossbred pigs for better growth performance, higher weight gain, larger litter size and greater back fat thickness, which are in conformity with the reports of Rahman *et al.* [18]. Sources of labor and foundation stock were not associated with town ($p>0.05$). Hired labor was the leading supply of labor in the studied cities in view of the total population. The utilization of more hired laborer in the study districts might indicate good paying ability of the pig producers. Similar results were reported by Okoli *et al.* [19], where most pig farmers utilized hired labors in their pig farms. The majority (85.7%) of respondents in the three surveyed towns acquired their foundation stock from neighbor's herds, while 14.3% of them obtained from other towns and country; however, none of the respondents procured pigs from local market place. The results of the current study disagreed with reports of Ironkwe and Amefule [20], who stated that pigs were mostly (84%) procured from local market and only 16% of the respondents collected the pigs from any organized farm. The present variation may be due to the difference in social tradition of pig farming in central Ethiopia.

Working hour was similar while pig herd size was different cross the towns. The overall mean time spent on feeding and managing pigs was 7.07±0.251 hours per day.

Table 3: Water sources and watering frequency for small scale intensive pig production in east Shewa

Variables	Towns				Test	
	Addis Ababa	Bishoftu	Adama	Total	X ² -value	p-value
	N (%)	N (%)	N (%)	N (%)		
Watering frequency						
Once/day	9(25.7) ^a	10(25) ^a	9(30) ^a	28(26.7)	0.244	0.885
Twice/day	26(74.3) ^a	30(75) ^a	21(70) ^a	77(73.3)	0.244	0.885
Source of water						
Tap water	33(94) ^a	37(92.5) ^a	28(93.3) ^a	98(93.3)	0.096	0.953
Water well	2(6) ^a	2(7.5) ^a	2(6.7) ^a	6(5.7)	0.088	0.957
Use of water trough	35(100)	40(100)	30(100)	105(100)	-	-

N (%) depicts number or percent of respondents.

Table 4: Housing practices for small scale intensive pig production in east Shewa

Variables	Towns				Test	
	Addis Ababa	Bishoftu	Adama	Total	X ² -value	p-value
	N (%)	N (%)	N (%)	N (%)		
Wood walled	8(22.9) ^a	8(20) ^a	7(23.3) ^a	23(21.9)	0.139	0.933
Brick walled	4(11.4) ^a	12(30) ^b	3(10) ^a	19(18.1)	6.20	0.045
Wall made of soil and wood	23(65.7) ^a	23(57.5) ^a	20(66.7) ^a	61(62.9)	0.801	0.670
Recommended housing	2(5.7) ^a	9(22.5) ^b	2(6.7) ^a	13(12.4)	6.113	0.047
Not recommended housing	33(94.3) ^a	31(77.5) ^b	28(93.3) ^a	92(87.6)	6.113	0.047
Group housing	35(100)	40(100)	30(100)	105(100)	-	-

N (%) depicts number or percent of respondents; ^{a,b} values with one superscript letter in common are not significantly separated.

The current results agreed with the reports of Klooster and Wingelaar [21], who mentioned that intensive pig production system required significant inputs of time. The number of pigs reared per household in Bishoftu town was higher ($P < 0.05$) than those in Addis Ababa and Adama towns. The higher number of pigs in Bishoftu could be attributed to better adaptation, relatively adequate feed production and allocation of more land for livestock farming.

Watering Practices for Small Scale Intensive Pig Production in East Shewa: Watering practices for small scale intensive pig production are presented in Table 3. Frequency of watering and sources of water did not vary across different regions. All households in the three sites reported that water was supplied to the pigs using water troughs. A large number (73.3%) of farmers provided clean drinking water, meant for humans, twice a day. The farmers reported that tap water (93.33%) the main source of water across the study sites.

Housing Practices for Small Scale Intensive Pig Production in East Shewa: Table 4 indicates housing practices for small scale intensive pig production in Addis Ababa, Bishoftu and Adama towns. A large number ($p < 0.05$) of brick walled pig houses were observed in Bishoftu compared to Addis Ababa and Adama. In addition, a large portion ($p < 0.05$) of pig farmers in Bishoftu constructed pig houses based on the recommended housing system for pig production compared to Addis Ababa and Adama. The results might indicate that the pig farmers in Bishoftu reinvested the cash obtained from sell of pigs on constructing brick walled houses.

According to their ages and performances, farmers had separated fattening and maternity pens. The focus group discussions conducted across the three districts revealed that the space allowance per pig was inadequate. The insufficient floor spacing might be as a stressor to pigs, speed up the spread of contagious diseases especially where animals have been over-crowded in a

place thus leading to high piglet mortality and poor performance.

CONCLUSION

Male headed households were dominant in the small scale pig production system across the study sites. Socioeconomic characteristics, farm profile, housing practices associated with the study sites since variation were detected along with the towns, mainly in relation to wealth status, farm experience, land size, herd size, housing practices (brick walled, recommended and non-recommended housing). Future development endeavors in pig production in east Shewa of central Ethiopia should take in to account the diverse in socio-economic characteristics, farm profile and housing practices of the towns.

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