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Full Length Research Paper

Swine Production, Productivity and Breeding Practices in Ethiopia

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The study was undertaken to characterize breed features, reproductive performance, breeding practice, breed selection criteria and herd replacement in Ethiopian swine production systems. A total of 66 swine farms were selected in six major towns to collect quantitative and qualitative data on the studied parameters. A multi-stage sampling procedure was employed to select sampling areas and respondents. A standardized questionnaire was used to collect the data using person to person interview. Data were analyzed using appropriate statistical procedures of SAS and SPSS software packages. The study revealed that Ethiopian swine breeds had diverse coat colors where white coat color was the predominant one. Average reproductive performances of swine herds for age at first puberty, litter size and gestation length were ranged from 9 – 10 (months), 8 – 10 (piglets per farrowing) and 3 to 3.5 (months), respectively. None of these reproductive performances were significant (P>0.05) across the three scales of production. About 76 – 86% of the total interviewed swine producers did select sires and dams for breeding. Dams section was mainly based on health status, body conformation and mothering ability; whereas, sires selection was based on health status, body conformation and coat color. Findings of this study can support the development of breeding strategies aiming to improve Ethiopian swine production and productivity.

Keywords: Breeding practice, Ethiopian swine, Production Performance, Selection criteria.

INTRODUCTION

Although the importance and purpose of keeping swine might differ from country to country within African continent, the swine producers are increasing in number. Swine are becoming an important species for fighting poverty in many of the African countries. (Wabacha et al., 2004; llatsia et al., 2008; Kagira et al., 2010; Muhanguzi et al., 2012; Amills et al., 2013; Luka and Vidovi, 2013; kimbi and Lekule, 2016; Chenais et al., 2017).

Abbreviations:

EIAR - Ethiopian Institute of Agricultural Research
EMBRAPA - Brazilian Agricultural Research Corporation

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Although swine production in Ethiopia is at its infant stage, nowadays, it is getting better attention and emerging as a new business area. This can be associated with an ever increasing human population, increase the number of tourists and higher food demand in the country (Tekle and Kifleyohannes, 2013; Berihu et al., 2015; Birhan et al., 2015; Goraga et al., 2015;16).

Although the number of swine herds per region in Ethiopia is not many, the production is expanding across regions, especially in major towns such as Addis Ababa, Bahirdar, Gonder, Mekele, Debrezeit and Nazareth (Tekle and Kifleyohannes, 2013; Berihu et al., 2015; Birhan et al., 2015; Goraga et al., 2015;16).

Information on the existing breed characteristics, their performance for economically important traits and breeding practices adopted by the swine producers is crucial to make appropriate interventions aiming to improve the herds' production and productivity.

Unfortunately, there is critical information gap in the

swine sector in the country. The existing breeds have not been characterized yet and there is no clear information on the breeds' origin, type and their performance for various production and reproductive traits. Those previously conducted studies in the swine sector in the country mainly focused on swine production systems and health issues (Tekle and Kifleyohannes, 2013; Berihu et al., 2015; Birhan et al., 2015; Goraga et al., 2015/16).

Therefore, this study was initiated to generate key information particularly on reproductive performance and breeding practices in the Ethiopian swine production systems. The findings from the study can be used to develop research strategies aiming to improve Ethiopian swine breeds' production and productivity with the final goal of enhancing farm profitability, ensuring sustainable production and improve the livelihoods of the swine producers in Ethiopia.

MATERIALS AND METHODS

Description of the study area

As previously described by Goraga *et al.* (2015), the study was conducted in six major towns: Debrezeit (11°48'N; 38°30'E), Nazareth (08°32'N; 39°22'E), Addis Ababa (09°02'N; 38°42'E), Bahirdar (11°37'N; 37°10'E), Gondar (12°39'N; 37°30'E) and Mekele (13°33'N; 39°30'E), where swine production is most important in Ethiopia. Among the 66 visited farms, 30.3, 24.2, 16.7, 15.2, 9.1 and 4.5% were selected from Addis Ababa, Debrezeit, Nazareth, Bahirdar, Mekele and Gondar, respectively. The five locations were far from the capital city of Ethiopia (Addis Ababa) by 45 to 729 Km. They had an elevation range of 1700 to 2300 m.a.s.l. Their average annual rainfall and temperature ranged from 549-1420 mm and 12-45 °C, respectively. Urban agriculture was very well practiced in all of the six locations in Ethiopia. The data used in this study were collected within and around the six locations.

Sampling techniques and data collection

A multi-stage sampling method was applied to select sampling areas and respondents. To select data collection areas with swine production potentials, first, a preliminary survey was conducted using a one-page questionnaire in eleven locations in Ethiopia. Secondly, six locations with major swine production were selected from the eleven locations. A face to face interview using a standardized questionnaire (pre-tested) was employed to collect qualitative and quantitative data such as breed features, reproductive performances, breeding practices, breed selection criteria and sources of herd replacement. The 66 farms were representing small (< 50 pigs), medium (50-150 pigs) and large scale (> 150 pigs) productions. Data were collected by trained enumerators and agricultural experts.

Statistical analysis

Data were coded and stored on SPSS database. Quantitative measurement variables and their values were exported into Excel sheets to be analyzed using SAS software package. For analysis purpose, the data were clustered into three groups as small (< 50 pigs), medium (50-150 pigs) and large (> 150 pigs) scales of production. Continuous variables were analyzed using a generalized linear model procedure of SAS (SAS Institute Inc., 1999). Descriptive statistics such as percentages and frequencies were performed using the cross-tabulation procedure of descriptive statistics in SPSS software package. Chi-square test was performed to test the difference in the frequency distribution of the studied variables among the three scales of production. Rank means and standard errors of ranked variables were analyzed using Proc Survey means procedure of SAS. Differences in rank means across the three size of production were performed using a non-parametric Kruskal Wallis test (Proc NPAR1WAY Wilcoxon). Alpha level of 0.05 was used to reject the null hypothesis of no difference among the three scales of production.

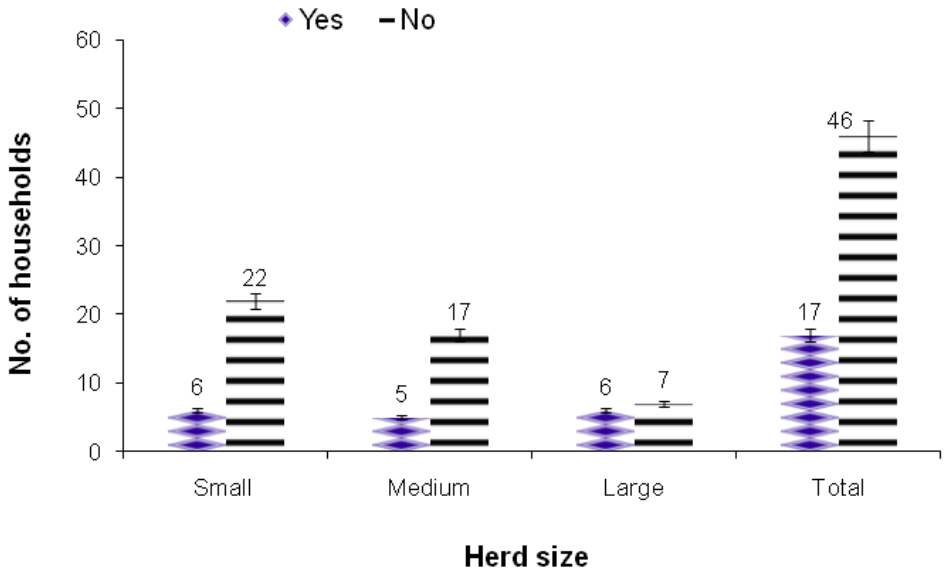
RESULT AND DISCUSSION

Perception on breed type, origin and coat color diversity

The question "how many or which kind of swine breeds exist in Ethiopia?" has not been answered yet. In this study, the swine producers were interviewed if they knew about their pigs' breed type and origin. Among the 66 respondents, 73% of them responded that they don't have any idea regarding the breed name and/or origin, whereas only 27% of them said that they know either the name or the origin (Figure 1).

The dominant coat colors of pigs were identified by interviewing the respondents and by direct observation of the pigs at the farm level. The swine producers were asked if there is coat color diversity in their pigs. Among the 66 interviewed respondents, 68.8% of them said "yes", and the remaining 31.1% said "no" (Table 1). The different pigs' coat colors observed at the visited farms were white, black, brown and a mix of two or more colors. According to 85.7% of the total respondents, the predominant coat color of pigs was "white" and this color was predominant across the three scales of production. The response of the respondents on coat color diversity was not significant (P>0.05) across the three scales of production.

According to Ramos – Onsins et al. (2014), the origin of domesticated pigs (Sus *scrofa*) are believed to



N.B. Herd size represented by small, medium and large scale refers to < 50, 50-150 and > 150 pigs per household, respectively.

Figure 1. Knowhow of swine producers on breed origin

Table 1. Coat color diversity of Pigs in the study areas

Body color	Herd size			Total	P value
	Small (< 50 pigs)	Medium (50-150 pigs)	Large (> 150 pigs)		
Are your pigs differ by coat color?					0.45
Yes	17 (40.5)	16 (38.1)	9 (21.4)	42	
No	11 (57.9)	5 (26.3)	3 (15.8)	19	
Total	28	21	12	61	
Which coat color is predominant?					0.13
White	27 (50	18 (33.3)	9 (16.7)	54	
Black	0 (0.0)	1 (100)	0 (0.0)	1	
Brown	0 (0.0)	2 (100)	0 (0.0)	2	
Red	0 (0.0)	0 (0.0)	0 (0.0)	0	
White with Black	1 (33.3)	0 (0.0)	2 (66.7)	3	
White with Red	0 (0.0)	0 (0.0)	1 (100)	1	
Brown with Black	0 (0.0)	1 (100)	0 (0.0)	1	
White with brown	0 (0.0)	0 (0.0)	1 (100)	1	

N.B numbers outside and inside parenthesis represent the number of respondents and their percentage from row totals, respectively. Herd size of < 50, 50-150 and > 150 pigs per household represent small, medium and large scale production, respectively.

be Southeast Asia. Furthermore, other studies reported that pigs were domesticated in Europe and Asia and afterward they did show subsequent genetic separation and introgression (White, 2011). The most common pig breeds for worldwide commercial pig production are Yorkshire, Landrace, Duroc, Hampshire, Berkshire, Tibetan, Tamworth, Meishan and their crosses (FAO, 2009). According to Gifford-Gonzalez and Hanotte (2011), domestic pigs in Africa do have a mixed origin of introduction. They are more of European X Asian crossbreds and some were directly introduced from Southeast or East Asia. Pig breeds such as Large White, Landrace, Camborough, and crossbreds are found in Uganda (Emmanuel et al., 2015) and those breeds such as Large White, Large Black, Duroc, Hampshire and Landrace are found in Nigeria (Adeoye et al., 2016).

This study indicates that the Ethiopian swine producers' awareness of their pigs' breed type and origin is very low. Based on the information we obtained from interviewed respondents and based on the morphometric characteristics of the pigs (Table 1), it seems that the majority of the swine breeds found in Ethiopia are crossbreeds which are the crosses of two or more of the commercial breeds with Eurasian origin and common to other African countries such as Nigeria and Uganda. However, this conclusion needs further confirmation at the molecular level to confirm their exact type and origin of the swine breeds found in Ethiopia.

Reproductive performance

Unlike other mammalian livestock species, pigs are known to have very high reproductive performances. In our study, female pigs reached sexual maturity in less than a year, i.e. the herd average age at first service was ranged from 9.3 to 9.7 months and this was not significant (P>0.05) across the three scales of production (Table 2).

Unlike large ruminant mammals, sows can give birth 2 to 3 times per year. In our study, the number of farrowing (birth) per sow per year was ranged from 2.2 to 2.3. This shows that pigs found in Ethiopia give birth at least twice a year.

The other important reproductive trait in pigs is litter size. The average litter size of sows at visited farms was ranged from 8.3 to 10 piglets per farrowing and it was not significant (P>0.05) across the three scales of production. Assuming this average litter size per sow per farrowing and twice farrowing per sow per year, a sow can give 17 to 20 piglets per year. But "how many of those piglets are born alive per sow per year?" is an important question. According to the findings of this study, the number of piglets born alive per sow per year was ranged from 14 to 19 and it was significant (P<0.05) across the three scales of production. On the other hands, the number of still birth (dead born) per sow per year was ranged from 2.4 to 3.2.

Regarding weaning age, sows in the visited farms wean their piglets in 2.5 to 2.9 months time. Although it was not significant, weaning age was improved as the scales of production increased. For various reasons, all piglets born alive might not reach until weaning age, i.e. some may die. In our study, the number of weaned piglets per sow per year was in the range of 12.4 to 16.3. This shows that at least 2 piglets might die during the pre-weaning production period.

The other reproductive trait which makes pigs a unique mammalian livestock species is "gestation length, which is the time interval from conception to delivery." Based on our study, the average gestation length of sows was in the range between 3.3 to 3.5 months across the three scales of production and this was not significant (P>0.05) across the three scales of production. The sows kept in medium and large scale production had an average gestation length which is faster by 5 days than those sows kept in small scale production. This might be associated with management differences between the different scales of production. If it is not purposively prolonged, sows kept in the studied areas could manage to come into next conception in 1.9 to 2.2 months time.

According to the findings of previous studies, age at first farrowing was reported to be 8 months in Ethiopia (Tekle 2013) and 10 to 17 months in Kenya (Mutua et al., 2011). Our finding of 13 months average age of sows at first farrowing is in agreement with the findings in Kenya. However, the previous finding by Tekele (2013), who reported 8 months age at first farrowing might not be achievable in many farms in Ethiopia.

Tekle (2013) found that Ethiopian pigs could give birth on average twice per year; whereas, pigs in Namibia could farrow in most cases once a year (Petrus et al., 2011). The value we obtained on the number of farrowing per sow per year (=2) was equivalent to the value reported previously in Ethiopia by Tekle (2013) but it was higher than the value (=1) reported in Namibia.

According to Tekle et al. (2013), Ethiopian pigs had an average litter size of 11 piglets per sow per farrowing; whereas Emmanuel et al. (2015) reported a litter size of 7 to 14 in Uganda. In a separate study, Petrus et al. (2011), found a litter size of 4 to 7 piglets per sow per farrowing in Namibia. Our findings on the average litter size of sows per farrowing (8.3 to10) was lower than the value previously reported in Ethiopia by Tekle et al (2013), but it was higher than the value reported in Namibia and in between the values reported in Uganda.

In Uganda, the average number of piglets born alive per sow per farrowing and the number of piglets weaned per sow per farrowing were 6 to 13 and 5 to 11, respectively (Emmanuel et al., 2015). Our findings on the average numbers of piglets which were born alive per sow per farrowing (8.6 to 10) and the number of piglets which were weaned per sow per farrowing (6.2 to 8.2) were in between the values reported in Uganda.

The finding of this study on the average age of piglets at weaning which is 10.7 to 12.4 weeks of age is relatively higher than the weaning ages of piglets reported in Kenya which is 2 to 9 weeks (Mutua et al., 2011) and in Uganda, 6.4 to 9.1 weeks (Emmanuel et al., 2015).

The 14.5 to 25% of average pre-weaning mortality rate which was observed in our study in Ethiopia was relatively higher than the pre-weaning mortality rate (12%) of piglets which was reported in Nigeria (Adeoye et al., 2016). On the other hand, Emmanuel et al (2015), reported 1 to 2 still births per sow per farrowing in Uganda and this was in agreement with our findings where we observed on average 2 still births per sow per farrowing.

Table 2. Means ± SE of sows' performance for reproductive traits

Trait	Herd size			P-value
	Small (< 50 pigs)	Medium (50-150 pigs)	Large (> 150 pigs)	
Age at first service	9.3 ± 0.5	9.7 ± 0.4	9.4 ± 0.3	0.70
Frequency of birth/sow/yr	2.2 ± 0.1	2.3 ± 0.1	2.2 ± 0.2	0.60
Litter size	8.6 ± 0.3	8.3 ± 0.3	10 ± 0.4	0.07
No piglets born alive /sow/yr	14 ± 1.2	17.9 ± 1.0	19.1 ± 1.4	0.01
No still birth /sow/yr	3.3 ± 0.4	2.4 ± 0.4	3.2 ± 0.4	0.24
No weaned piglets / sow/yr	12.4 ± 1.6	13.5 ± 0.8	16.3 ± 1.3	0.16
Gestation length	3.5 ± 0.1	3.3 ± 0.1	3.3 ± 0.2	0.60
Farrowing to next conception	2.2 ± 0.2	1.9 ± 0.2	2.1 ± 0.3	0.70
Weaning age	2.9 ± 0.3	2.7 ± 0.3	2.5 ± 0.4	0.73

N.B Herd size of < 50, 50-150 and > 150 pigs per household represent small, medium and large scale production, respectively. Superscript letters refer to significant difference among the three scales of production. The same letters across scales of production refer to no significant difference. ^{SE} refers to standard error.

Breeding practices

It was also the interest of this study to understand the breeding practices and breed selection criteria of swine producers in Ethiopia. As presented in Table 3, from the 58 interviewed swine producers, 58.6% of them responded that they are practicing controlled breeding, i.e. they control over which dams to be mated with which sire, whereas the remaining 41.4% of them were practicing uncontrolled breeding. Sires selection as parent of next generation was practiced at 84.5% of the households, where the remaining 25.5% of the households didn't select males for breeding. Sire selection was significant ($P<0.05$) across the three scales of production. On the other hand, dams' selection as a parent for next generation was practiced at 76% of the households, while the remaining 24% of the swine producers didn't select females for breeding. Dams selection was not significant ($P>0.05$) across the three scales of production.

In most cases, the Ethiopian swine producers practice random breeding to mate the selected sows and sires. In this system, no specific breeding scheme is followed. Contrary to our findings, the swine producers in Uganda practice alternative breeding systems such as Criss-crossing, terminal crossing, and random breeding systems (Emmanuel et al., 2015).

Those swine producers practicing controlled breeding in Ethiopia use different techniques such as castrating non-breeding males, keeping males and females separately, and selling or slaughtering unproductive males and females in order to avoid unwanted mating (Table 4). Among those techniques of avoiding uncontrolled breeding, castration of males followed by keeping males and females separately were the mostly pre-dominant practices. This was true across the three scales of production. None of the uncontrolled breeding avoiding practices were significant ($P>0.05$) across the three scales of production.

Breed selection criteria

Those swine producers selecting males (sires) and females (dams) as potential parents for next generation use different herd selection criteria such as coat color, health status, body conformation, parent history, and temperament, prolificacy, mothering ability, age and popularity of the pigs (Table 5). The swine producers in small scale production select sows mainly based on their health status, coat color and body conformation from high to low degree of importance, respectively, whereas, the swine producers in medium scales of production mainly depend on health status, body conformation and mothering ability from high to low degree of importance, respectively. On the other hand, health status, mothering ability and body conformation were the pre-dominant sows' selection criteria in large scale production. Among those sows' selection criteria, health status of the pigs was the pre-dominant selection criterion across the three scales of production. The studied sows' selection criteria, except coat color were not significant ($P>0.05$) across the three scales of production.

Similar to sows' selection criteria, selection for sires (boars) as potential fathers for next generation was mainly depend on non-production traits such as health status, body conformation and coat color (Table 6). Those swine producers in small scale production did select sires mainly based on their health status, coat color and body conformation from high to low degree of importance, respectively, whereas, the swine producers in medium scales of production mainly depended on health status, body conformation and coat color from high to low degree of importance, respectively. On the other hand, health status, coat color and body conformation were the pre-dominant sows selection criteria in large scale production. Among those sires' selection criteria, health status of the pigs was the pre-dominant selection criterion across the three scales of production. In the large scale production, health status

Table 3. Swine producers' breeding practices

Breeding practice / selection	Herd size			Total	P value
	Small (< 50 pigs)	Medium (50-150 pigs)	Large (> 150 pigs)		
Do you practice controlled breeding?					0.880
Yes	13 (38.2)	12 (35.3)	9 (26.3)	34	
No	10 (41.7)	9 (37.5)	5 (20.8)	24	
Total	23	21	14	58	
Do you select males for breeding?					0.004
Yes	15 (30.6)	20 (40.8)	14 (28.6)	49	
No	8 (88.9)	1 (11.1)	0 (0.0)	9	
Total	23	21	14	58	
Do you select females for breeding?					0.51
Yes	15 (36.6)	15 (36.6)	11 (26.8)	41	
No	7 (53.8)	4 (30.8)	2 (15.4)	13	
Total	22	19	13	54	

N.B numbers outside and inside parenthesis represent the number of respondents and their percentage from row totals, respectively. Herd size of < 50, 50-150 and > 150 pigs per household represent small, medium and large scale production, respectively.

Table 4. Rank means ± SE of methods of controlled breeding adopted by swine producers

Farm practice	Herd size			P-value
	Small (< 50 pigs)	Medium (50-150 pigs)	Large (> 150 pigs)	
Castration of unwanted males	1.4 ± 0.2	1.3 ± 0.3	1.5 ± 0.2	0.51
Separating females & males	1.6 ± 0.3	1.8 ± 0.2	1.9 ± 0.2	0.54
Selling unwanted pigs	2.8 ± 0.4	2.7 ± 0.2	2.8 ± 0.2	0.65
Using AI service	5.3 ± 0.3	5.0 ± 0.0	3.7 ± 0.9	0.12
Slaughtering unwanted pigs	3.8 ± 0.4	2.5 ± 0.3	3.4 ± 0.3	0.13

N.B Herd size of < 50, 50-150 and > 150 pigs per household represent small, medium and large scale production, respectively. Superscript letters refer to significant difference among the three scales of production. The same letters across scales of production refer to no significant difference. Rank means refer to means of ranks of the studied variables, where 1 refers to most important to 6 not important. SE refers to standard error.

Table 5. Rank means ± SE of sows' selection criteria of swine producers

Trait / character	Herd size			P-value
	Small (< 50 pigs)	Medium (50-150 pigs)	Large (> 150 pigs)	
Coat color	3.5 ± 0.5	4.1 ± 0.5	5.1 ± 0.5	0.04
Health status	2.9 ± 0.6	3.1 ± 0.4	2.6 ± 0.5	0.72
Body conformation	3.5 ± 0.4	3.7 ± 0.5	4.1 ± 0.6	0.91
Parent history	5.4 ± 0.5	5.4 ± 0.6	5.1 ± 0.6	0.96
Temperament	6.5 ± 0.5	6.2 ± 0.7	6.6 ± 0.6	0.96
Prolificacy	5.2 ± 0.7	5.6 ± 0.7	4.3 ± 0.8	0.49
Mothering ability	4.1 ± 0.6	3.9 ± 0.5	3.4 ± 0.7	0.80
Breed popularity	6.3 ± 0.6	5.6 ± 0.6	4.8 ± 0.8	0.30
Age	6.5 ± 0.6	6.4 ± 0.5	6.1 ± 0.6	0.85

N.B Herd size of < 50, 50-150 and > 150 pigs per household represent small, medium and large scale production, respectively. Superscript letters refer to significant difference among the three scales of production. The same letters across scales of production refer to no significant difference. Rank means refer to means of ranks of the studied variables, where 1 refers to most important to 9 not important. SE refers to standard error.

Table 6. Rank means ± SE of Boars' selection criteria of swine producers

Trait / character	Herd size			P-value
	Small (< 50 pigs)	Medium (50-150 pigs)	Large (> 150 pigs)	
Body color	2.4 ± 0.2	2.7 ± 0.4	4.3 ± 0.7	0.07
Healthiness	1.9 ± 0.3	1.9 ± 0.2	2.3 ± 0.4	0.94
Body conformation	3.0 ± 0.4	2.3 ± 0.3	2.3 ± 0.4	0.27
Parent history	5.4 ± 0.5	5.3 ± 0.5	4.5 ± 0.6	0.43
Temperament	6.6 ± 0.4	7.1 ± 0.5	6.6 ± 0.5	0.53
Semen volume	8.0 ± 0.4	6.7 ± 0.6	6.5 ± 0.6	0.12
No of libido	6.1 ± 0.5	6.8 ± 0.5	6.0 ± 0.7	0.44
Breed popularity	6.0 ± 0.6	5.2 ± 0.3	5.6 ± 0.7	0.22
age	5.2 ± 0.4	5.7 ± 0.4	5.5 ± 0.5	0.67

N.B Herd size of < 50, 50-150 and > 150 pigs per household represent small, medium and large scale production, respectively. Superscript letters refer to significant difference among the three scales of production. The same letters across scales of production refer to no significant difference. Rank means refer to means of ranks of the studied variables, where 1 refers to most important to 9 not important. SE refers to standard error.

and body conformation were equally important. The studied sire selection criteria were not significant (P>0.05) across the three scales of production.

Our findings indicated that, in Ethiopia, herd selection criteria for pigs is quite different from the selection criteria for other livestock species such as dairy and beef cattle, sheep and goat. In swine production, producers give more emphasis for non-production traits such as health status, coat color, mothering ability and body conformation, whereas, production traits such as milk, meat, growth rate and feed conversion efficiency are the pre-dominant selection criteria for other livestock species. This could be due to the fact that pigs are very fast growing and reproducing species than the other livestock, as the result, fitness traits are more important than production traits in pigs' herds.

The purpose of keeping pigs in African countries like Ethiopia is mainly for income generation (Tekle et al., 2013; Berihu et al., 2015), however, people in countries like Namibia keep pigs also for home consumption (Petrus et al., 2011). Home consumption as a primary objective of keeping pigs in Ethiopia is important only at few households with Asian nationalities e.g. Chinese people. So, selection of breeding sows and boars as parent stock in African countries might mostly attached with performance traits with market demand such as growth and reproductive traits. For instance, the development of dwarf Ashanti pig breed in Ghana aimed at improving growth rate, productivity, and litter sizes at birth and weaning (AU-IBAR, 2016).

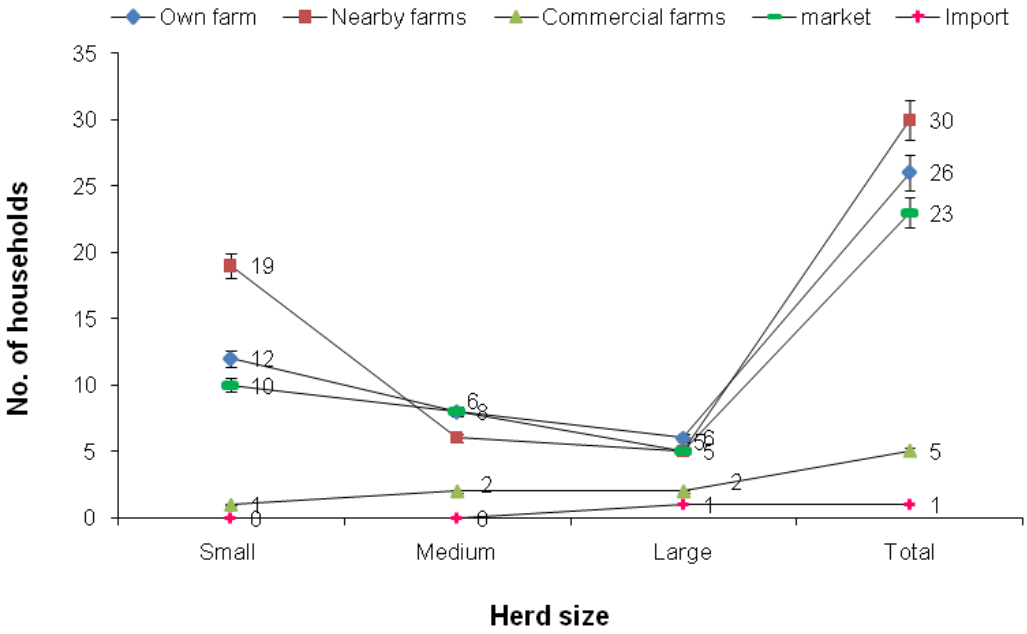
Herd replacement

The interviewed swine producers in Ethiopia did replace their culled pigs from different sources such as from their own farm, nearby small farms, commercial farms, informal markets, and by importing from abroad. In this study, the major sources of herd replacement were from nearby small farms, own farm and by buying from local informal markets. The swine producers in small scale production mostly replaced their herd from nearby small farms. Importation from abroad was the least source of herd replacement and it was practiced only by those swine producers at large scale production (Figure 2). Some swine producers were using more than one source of herd replacement, because of this, the total respondents (85 households) in Figure 2 exceeds the actual number of respondents (66 households) we interviewed in the study.

In agreement with our findings, the swine producers in Uganda replace their herds with pigs obtained from different sources with unknown health status and with no quarantine before entry (Emmanuel et al., 2015).

CONCLUSIONS

Most of the findings of this study on the reproductive performances of Ethiopian pigs were either in the range or higher than the mean reproductive performances reported for the pig breeds found in other African countries such as Kenya, Namibia, Nigeria and Uganda.



N.B. Herd size represented by small, medium and large scale refers to < 50, 50-150 and > 150 pigs per household, respectively.

Figure 2. Sources of herd replacement

This study revealed that traits such as health, body conformation, temperament, and coat color are very important parent selection criteria in Ethiopian swine production systems. However, production and reproductive traits such as growth rate, age at puberty, litter size and gestation length are usually given less emphasis as parent selection criteria in swine production as compared with the emphasis given to those traits in other livestock production systems such as dairy cattle, beef and small ruminant production.

Although this study provided basic information on the swine breeds of Ethiopia, complete understanding on the type and origin of the breeds and also their genetic relationships require further detailed investigations at phenotypic and molecular level.

Information obtained from this study can support designing of community based breeding program which takes into consideration the breed selection criteria of the swine producers and the reproductive performance of the breeds in Ethiopia. Furthermore, the key information generated from this study could support for developing research and development intervention strategies aiming to improve the swine sector and its economic benefit in the country.

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