

Contribution of donkeys to household food security: a case study in the Bawku Municipality of the Upper East Region of Ghana

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Abstract

The survey was done to assess the contribution of donkeys to the food security needs of owners in Bawku Municipality. Formal questionnaire and informal interviews were used to elicit information from 100 purposively sampled donkey owners. Descriptive statistics and linear regression were used to analyze the data. The donkey was a source of employment particularly for the youth and female-headed households in the transportation of goods. It also made a direct positive contribution to food security of many female-headed as well as low income households. Increasing net income from the donkey however resulted in a reduction in the expenditure made on food by most male-headed households while increasing the percentage of income saved. Government and NGOs, as a strategy to alleviate poverty may consider providing a donkey and cart to poor farming households and female-headed households in places with similar characteristics like Bawku and its environs.

Keywords: *Donkeys, food security, income, households*

INTRODUCTION

The Upper East Region has the fifth highest human population density in Ghana but highest in northern Ghana (GSS, 2012). The main occupation of the people is farming. The population density coupled with extensive rocky outcrops in parts of the region leaves less land for agricultural activities (Adiisi, 2003). This is evidenced by the frequent food deficits reported in this region, and its attendant food insecurity (Amuah, 2004).

Livestock has been identified by many researchers and development workers as playing a major role in ensuring food security in

northern Ghana (Reynolds, 1985; Millar et al., 1998; Thornton, 2010). The domestic poultry, sheep and goats have been identified as the food security animals because their sale provides cash for food, when household food crop barns are empty and for crop farm inputs for the next farm operations (Otchere et al., 1997). Animal traction may also be very strategic in the intensification of crop-livestock systems (Adiisi, 2003). According to Gina and Tadesse (2015), traction animals constituted a vital link between the house and the farm and they facilitated the creation of rural and urban

economic development opportunities. The donkey has been found to be one of the most cost-effective sources of transportation in peri-urban areas (Nengomasha et al., 2000). Animal traction can play an additional role of providing manure which is very important to ameliorate the soil. Ploughing with animals also causes less damage, compared to the tractor, due to the thin and already fragile topsoil characteristic of the region (Bobobee, 2000).

In northern Ghana, bullocks and bulls are the main animals used for ploughing. Efforts to improve food security through livestock improvement have focused on poultry, pig, sheep, goats and cattle (Otchere et al., 1997), giving little attention to the donkey. The presence of donkeys in the Bawku area warrants a study on the value of their socio-economic contribution to the lives of the people. Also the strategic location of Bawku as a border town and its proximity to Cinkasse in Togo and Biitu in Burkina Faso has made it highly commercial and the people are business-oriented. About 60% of the people however live in the rural areas and majority are farmers (MoFA, 2010).

The objective of the study was therefore to assess ownership pattern and the donkey's potential to enhance household food security in the Bawku Municipality of the Upper East Region.

MATERIALS AND METHODS

Study area

The study was conducted in the Bawku Municipality of the Upper East Region of Ghana. The Bawku Municipality lies on latitude 11° north of the Equator with an average rainfall of between 800 and 850 mm per annum (MoFA, 2010). The vegetation is Sahel Savanna. The rainy season begins in May and ends in October with a growing period of about 120-180 days and peak rainfall occurring in July and August (MoFA, 2010). Mean daily temperatures peak between 32°C and 37°C, and decline to 25°C in August (MoFA, 2010). During the dry season, temperatures reach as high as 45°C in the day time and fall to 15°C at night (MoFA, 2010).

Bawku Municipality is the largest and most populous in the Upper East Region with a total human population of about 217,791,

representing 20.8% of the total population of Upper East Region (GSS, 2012).

Source of data and method of data collection

Both primary and secondary data were used. Primary data were obtained from administered questionnaires and informal interviews. Secondary data were obtained from various sources of literature.

One hundred donkey owners from 100 households in five communities were purposively sampled for interviews.

Limitations of data

Many respondents had difficulty in quantifying their farm outputs in monetary terms. Respondents also mostly relied on memory recall in stating how much income they earned annually from their donkeys.

Data analysis

Primary data was analyzed using descriptive statistics from SPSS software (Version 11) to determine the ownership pattern of the donkey and the constraints in keeping it. Scatter charts in Microsoft excel was used to determine the contribution of the donkey to household income and food security. Household expenditure on food per annum was regressed on household net income from the donkey per annum to measure the significance of income from the donkey on household food security. Total household annual income was also regressed on the total annual net income from the donkey in an attempt to assess the role the donkey played in promoting food and income security of the owner's household. The exchange rate from US dollar to the Ghanaian cedi was US1.00 = GH¢4.00.

RESULTS AND DISCUSSION

Background information on respondents

The average age of respondents who owned donkeys in the study area was 46 years, with the highest number of owners between the ages of 31 and 40 years. This was because, at this age many of the respondents were married and had established their own families and therefore needed to increase their income level and productivity to enable them live up to their responsibilities. From the ages of 61 and above,

many of them were no longer able to cater adequately for the donkey and use it due to old age. Besides, their responsibility with regards to contributing to family sustenance would have also been alleviated by their children who would have become income earners as well (Figure 1).

Below the age of 30 however, the ownership of the donkey was low. This is perhaps because most people in this age category were unemployed and could not afford a donkey and cart, except for persons who had traveled to the south of Ghana to work for money or those from wealthy homes. Even though many of the people in the 21-30 age category did not own a donkey, they constituted the majority of the people who handled the donkey on behalf of their owners.

Average household size of respondents in the study area was 12. About 58% of the respondents had a household size of 1-7 people while 42% of the respondents had 8 or more persons per household. This shows a higher average household size than the 7 people indicated by the GSS (2012) in the population and housing census. In the opinion of respondents, household size did not have any effect on the ownership, however smaller households might be constrained in their ability to feed and water their donkeys.

Ownership of donkey and cart

Ownership was predominantly by men accounting for about 75% of the respondents as against 25% ownership by females. In Ethiopia it was about 80% men against 20% women possession of traction animals (Gina and Tadesse, 2015). The survey also revealed that the ownership of the donkey was individual, family or clan-based. There were however no cultural or religious barriers to women owning and using the donkey in the Municipality. This agrees with the findings of Adiisi (2003) that women owned and used the donkey for transportation in the Upper East Region. Gina and Tadesse (2015) surmised that rearing of work animals was easy and possible for poor households and actually helped to increase their social acceptance.

Reasons for keeping the donkey

The main reason donkeys were kept in the Bawku area was for transportation (91% of respondents) of household resources such as water, building materials, farm inputs and farm produce that might have otherwise been carried by women and children over long distances (Table 1). According to Valette (2014), donkeys were used to bring in feed for the other livestock species and also carry sick animals to the veterinary clinic. Fielding and Krause (1998) remarked that pack donkeys alleviated the work of women farmers by carting farm produce over long distances. Manure from the donkey was also used by farmers to improve the fertility of the soil on their farms for increased crop production. A few respondents also indicated that they harnessed their donkeys for ploughing since they could not afford oxen but at the same time needed to take advantage of early rains to obtain good harvest. In Ghana where refuse management is a problem, donkeys can be used to perform the task of refuse collection. Donkeys were not kept for their meat in the municipality but old donkeys were sold to buyers from Bolgatanga where donkey meat was popular among some Frafras who are an ethnic group in Upper East Region.

Age category of respondents and number of donkeys owned

Table 2 shows that the respondents who were aged between 41 and 50 years, even though they did not constitute the majority of respondents (Figure 1), they had more donkeys than the other age groups. One hundred and nineteen donkeys were owned by the 100 respondents in the study area. This therefore translated into one household owning an average of 1 donkey which was normally used for work. The donkeys were made up of 102 jacks and 17 jennies. While the jacks were preferred for work, the jennies were kept for breeding. In the Bawku area therefore, the jacks constituted about 86% of the adult population (Table 2). Nengomasha et al. (1999) and Geiger and Hovorka (2015) made similar observations that male donkeys were preferred in general for work as the female required time off around the birth of their offspring.

Means of acquiring the donkey and cart

Ninety one percent (91%) and 84% of the respondents in the area acquired their donkey and cart, respectively, through purchase. Five percent (5%) and 11% of them (mostly those within the ages of 21-30) inherited the donkey and the cart, respectively from their parents or relations, while 4% and 5% of the people acquired the donkey and the cart, respectively as gifts from relations.

Age category of working donkey

The survey revealed that 83% of the donkeys used in the study area were between the ages of 2 and 5 years. Donkeys at this age were strong and could carry more load than older ones. This somehow agrees with the results of Zenebe and Fekade (2004), and Nengomasha et al. (2000) that donkeys were mature at 4 to 5 years of age. About 17% of the respondents however used donkeys that were between 6 and 9 years. Though they agreed that donkeys at this age were not very strong yet they were more docile and had more experience, and could therefore be harnessed and managed by women and children. It was also revealed that older donkeys could carry loads to their owner's homes without being guided by anybody due to their experience and familiarity with the route.

Working life of the donkey

Eighty nine percent (89%) of the respondents said that the donkey was capable of working for up to 15 years. But the active working life of the donkey was usually 10 years after which its strength and productive capacity gets diminished. According to Zenebe and Fekade (2004) the working life of the donkey was over 5 years.

Income from the donkey

Having a donkey could earn the owner a mean annual income of US\$110.06 from using the donkey for transport of various loads. Hiring out the donkeys to other people could also earn a mean of US\$70.56 for the household. In addition, manure from the donkey could be sold for a mean of US\$28.27. Since ploughing with the donkey was not very popular in the study area, very little income (US\$8.89) was earned

from this activity by the donkey (Figure 2). According to Nengomasha et al. (1999), donkeys can be used for effective ploughing when they are in teams of three or more and using lighter plough implements.

Fixed cost of using the donkey for transport

The mean cost of a donkey cart (57%) was higher than that of a donkey (43%). The cost of a good donkey cart by the Intermediate Technology Transfer Unit (ITTU), a standard implements manufacturing company in northern Ghana was US\$110.22 while the mean cost of a healthy donkey within the working age was US\$83.33. Therefore, with US\$195.00, a household could purchase a donkey and a cart. In Ethiopia, donkey cost was about US\$73.00 (Admassu and Shiferaw, 2011). These fixed assets could generate wealth for the household for a period of 5 years or more depending on the age of the donkey at the time of purchase.

Other costs involved in keeping and using the donkey

The costs incurred on the donkey included the harness of the donkey, repairs of cart, feeding and watering, housing and healthcare. No cost was incurred in the training of the donkey because the respondents did the training themselves. Feeding accounted for about 41% of the other costs, followed by repairs of cart (27%). Health and harness were 13% each while housing formed 6% of these costs per annum. Mean cost of maintaining the donkey and cart per annum was estimated at US\$37.57. Feed was quite expensive in Ethiopia (US\$100.00) (Admassu and Shiferaw, 2011) and India (US\$1,830.00) (Zaman et al., 2014), and interventions are needed in Ghana to keep feed cost low. It was realized that majority of the respondents prepared their own harnesses from local materials and about 95% of them did not provide housing facilities for their donkeys but rather tied them in the yard or outside the house exposing them to the vagaries of the weather. This notwithstanding disease incidence of these donkeys was observed to be low. Compared to cattle Pandey and Eysker (1991) reported that donkeys were less likely to succumb to diseases. Also they are better

adapted to dry conditions and subsist on less feed (Gina and Tadesse, 2015). According to Geiger and Hovorka (2015), perhaps because of their hardiness, donkeys suffer various abuses at the hands of people particularly children who handle them and this raises a number of animal welfare concerns.

A donkey health assay in Botswana revealed that 69% of the surveyed population of donkeys exhibited a sad demeanour and a significant correlation was detected between scar prevalence on the donkey and disinterest in its handler (Geiger and Hovorka, 2015). Canacoo and Avornyo (1998) estimated the time donkeys spent grazing in the dry season to be about 80% and it is doubtful if donkeys used for work actually get enough time to ingest feed.

Profitability of ownership

The donkey might fetch about US\$217.78 per annum, and for five years it would amount to US\$1,088.90 while the cost of a donkey and cart which would be used for that same period of five years might be around US\$193.55. Estimated cost of maintaining a donkey and cart per annum was US\$37.57 equal to US\$187.85 in five years. Potential profit is therefore estimated at US\$707.50. Considering the costs involved in owning a donkey and a cart as against the benefits that could be derived from it, the enterprise could be said to be viable. This information gives credence to why people in Bawku area continue to use the donkey. Additionally, Admassu and Shiferaw (2011) have also reported that it was profitable to own a donkey in Ethiopia.

Household annual expenditure on food

The mean of household annual expenditure on food for the 100 respondents was US\$855.49. Of this amount, they spent US\$362.24 on tuo zaafi (thick porridge made from maize, sorghum or millet flour), US\$184.20 on rice and stew, US\$185.29 on rice and beans stew, US\$62.06 on porridge, US\$28.37 on banku (thick porridge prepared with maize and cassava dough), US\$15.00 on fufu (pounded boiled yam or cassava and plantain), US\$5.00 on kenkey (thick porridge

made from maize dough) and US\$13.33 on fried plantain/yam per annum. This study affirms that the main staple of the people of the Upper East Region was tuo zaafi.

Households mean annual income from livelihood sources

The mean annual income of the 100 households was US\$1,160.87. Of this amount, the donkey contributed a mean of US\$217.78, constituting about 19% of the mean annual income of the household. This placed the donkey as the second largest contributor after crops to household income for the respondents in the study area. Next in a decreasing order were animal rearing, salary, remittances from relatives and corn mill operation as major sources of income for the households (Table 3). According to Admassu and Shiferaw (2011), equines in Ethiopia contributed about 14% to total household income, and their contribution appeared to be higher than the contribution from other livestock species. They estimated an annual income of about US\$750.00 from equines compared to the low value of US\$217.78 reported in this study. Warboys et al. (2014) recorded a daily income of US\$10 from equine services in Honduras.

Contribution to food security in female-headed households

When the 100 households were separated into male and female-headed households, the relationship between net income from the donkey and the amount spent on food per annum in female-headed households was positive though not statistically significant:

$$y = 0.48^{N.S} (\pm 0.56)\chi + 735.93^{***} (\pm 131.74),$$

where:

y = expenditure on food,
 χ = net income from donkey,
N.S. = not significant, and
*** = $P < 0.001$

In the female-headed households, the equation was suggesting an increase in the amount of money spent on food with increasing net income from the donkey. The equation was also suggesting that the food security levels of the female-headed households varied widely. The high error value (± 0.56) associated with

the regression coefficient describes the situation where majority but not all the female-headed households used a significant amount of their net incomes from the donkey for household food consumption. For the female-headed households therefore, there was the tendency to use their net income from the donkey on the purchase of food for the house. This implies majority of the female-headed households probably used the donkey as a food security animal. For the 25 female-headed households, the amount spent on food per year when net income from the donkey was zero, was about US\$735.93 compared to an estimated US\$855.49 for the one hundred households surveyed. A higher proportion of the female-headed households might therefore be vulnerable, especially without the donkey. According to Gina and Tadesse (2015), work animals were a resource for sustainable food production and enhanced food security. Gender-responsive climate change interventions may consider the promotion of donkeys for poor female-headed households (Valette, 2014).

Contribution to food security in male-headed households

Concerning the 75 male-headed households that were included in the survey, the relationship between their net income from donkey use and total expenditure on food per annum was negative and given by;

$$y = -0.69^{N.S} (\pm 1.74)\chi + 983.80^{***} (\pm 277.26),$$

where:

y = total annual expenditure on food,

χ = net income from donkey use,

N.S. = not significant, and

*** = $P < 0.001$

In the male-headed households, the estimated average amount spent on food per household per year was US\$983.80 when net income from the donkey was zero. With increasing incomes from the donkey, the majority of male-headed households appeared to reduce their annual expenditure on food. Only few male-headed households increased expenditure on food with increasing net income from the donkey. Many of the male-headed households by their own estimation were food

secure even without income from the donkey. The male-headed households had a greater tendency to save on food while they were realizing increased net returns from their donkey enterprise. It appeared that the increasing net income from the donkey was associated with a decision to make more savings to invest in some other property. It was as though the donkey substituted for human labour for food production or earning income, and their presence resulted in a decrease in the number of people to be fed in a household or an increase in food production. The observations of Mrema (1994) were indicating that families with a donkey and cart benefited from early planting and more food harvest than those without this resource.

Contribution of the donkey to household total annual income

The contribution of the net income from the donkey to household total annual income was described by the equation:

$$y = 0.58^{N.S} (\pm 0.65)\chi + 1,138.84^{***} (\pm 103.69),$$

where:

y = household total annual income,

χ = household annual net income from donkey use,

^{N.S} = not significant, and

*** = $P < 0.005$

There was a positive, albeit not statistically significant relationship between net income from the donkey and annual total income. When net income from the donkey was zero, the total annual income per household was generally still significant (US\$1,138.84). The majority of donkey owners in Bawku Municipality were therefore probably already food secure because the total annual income per household (US\$1,138.84) exceeded the estimated annual expenditure on food per household (US\$855.49). While the contribution of the net income from the donkey might be significant for some households, it was not significant for all households surveyed. This observation is supported by the high variance (standard error = 0.65) associated with the regression coefficient.

CONCLUSION

Donkeys and carts in the study area were owned by mostly middle aged men with an average of one donkey and cart per household. In most female-headed households and households with low income, more money was spent on food as income from the donkey increased. Conversely, in most male-headed households and in households with otherwise higher expenditure on food, there was a decrease in expenditure on food as net income from the donkey increased.

The donkey therefore could be used to support female-headed households and households whose expenditure on food was below the mean annual expenditure on food by the households surveyed. In areas where donkey use is in high demand, the government and NGOs may supply donkey and cart to poor and female-headed households to enable them increase food production, net annual income and possibly attain food security. Keeping donkeys presented problems in the area of feeding and watering, especially during the latter part of the dry season. A few diseases also presented problems in the management of donkeys.

REFERENCES

- Adiisi, J. A. 2003. Assessing the impact and constraints of draught animals: a case study in the Bongo District in the Upper East Region. B.Sc. Thesis, University for Development Studies, Tamale, Ghana Pp 48-49.
- Admassu, B. and Shiferaw, Y. 2011. Donkeys, horses and mules – their contribution to people's livelihoods in Ethiopia. The Brooke, Addis Ababa, Ethiopia 72 pp.
- Amuah, D. 2004. Programme for Strengthening Community Organization and Development (POSCOM) with communities in the Kassena-Nankana District Assembly. A report prepared by POSCOM, P. O. Box 207, Bolgatanga, Upper East Region, Ghana 22 pp.
- Bobobee, E. Y. H. 2000. Animal traction technology resource mapping. In: *The Ghana Engineer*. Ghana Institute of Engineers (pubs). 2: 1-3.
- Canacoo, E. A. and Avornyo, F. K. 1998. Daytime activities of donkeys at range in the coastal savanna of Ghana. *Applied Animal Behaviour Science* 60: 229-234.
- Fielding, D. and Krause, P. 1998. Donkeys; The Tropical Agriculturist. Center for Tropical Veterinary Medicine, University of Edinburgh. Macmillan Education Ltd. London. Pp 7-12
- Geiger, M. and Hovorka, A. J. 2015. Using physical and emotional parameters to assess donkey welfare in Botswana. *Journal of the British Veterinary Association* 2: 1.
- Ghana Statistical Service (GSS) 2012. Population and housing census. Summary report of final results. Sakoa Press Ltd 105 pp
- Gina, T. G and Tadesse, B. A. 2015. The role of working animals toward livelihoods and food security in selected districts of Fafan Zone, Somali Region, Ethiopia. *Advances in Life Science and Technology* 33: 88 – 94.
- Millar, D., Karbo, N, Bruce, J., and Otchere, E. O. 1998. Group formation and West African Shorthorn Cattle development among the Konkombas and Chokosi of the Saboba-Chereponi District of the Northern Region. Technical Report. Animal Research Institute, Nyankpala, Ghana.
- MoFA (2010). Bawku Municipal. Physical and natural environment.
- Mrema, M. N. J. 1994. An economic evaluation of the utilisation of donkeys in small scale farming in Botswana. *Working Equines. Second International Colloquium Conference proceedings*. Pp. 303-314.
- Nengomasha, E. M., Pearson, R. A. and Smith, T. 1999. The donkey as a draught power resource in smallholder farming in semi-arid Western Zimbabwe. Performance compared with that of cattle when ploughing on different soil types using two plough types. *Animal Science* 68: 305-312.

- Nengomasha, E. M., Pearson, R. A. and Wold, A. G. 2000. Empowering people through donkey power into the next millennium. Empowering Farmers with Animal Traction. Animal Traction Network for Eastern and Southern Africa (ATNESA) Workshop proceedings 344pp. ISBN 0-907146-10-4.
- Otchere, E. O., Karbo, N., Addo-Kwaffo, A., Aning, K. G., Aboe, P., Clottey, V. A. and Asare, G. 1997. Livestock systems diagnostic survey, Saboba-Chereponi District, Northern Region. Animal Research Institute, Accra, Ghana.
- Pandey, V. S. and Eysker, M. 1991. Internal Parasites of Equine in Zimbabwe. Donkeys, mules and horses in Tropical Agricultural development. University of Edinburgh Pp167-173.
- Reynolds, L. 1985. Small-ruminant production: The present situation and possible interventions for improvement. Animal feed resources for small-scale livestock producers. The Second PANESA Workshop proceedings
- Thornton, P. K. 2010. Livestock production: recent trends, future prospects. Philosophical Translation of the Royal Society of Britain 365: 2853–2867. doi:10.1098/rstb.2010.0134
- Valette, D. 2014. Invisible helpers. Women’s views on the contributions of working donkeys, horses and mules to their lives: key findings from research in Ethiopia, Kenya, India and Pakistan. Voices from women International Report. The Brooke. 25 pp
- Warboys, D., Robles, M., Chapman, A. and Lagos Blessing, O. G. 2014. Cross-sectional survey on the importance of the role of working equids in Honduras. The 7th International Colloquium on Working Equids proceedings World Horse Welfare (pubs), Anne Colvin House, Snetterton, Norwich, Norfolk NR16 2LR, UK. Pp. 7 – 9.
- Zaman, S., Kumar, A. and Compston, P. 2014. Contribution of working equids to the livelihoods of their owners in Uttar Pradesh, India. The 7th International Colloquium on Working Equids proceedings . World Horse Welfare (pubs), Anne Colvin House, Snetterton, Norwich, Norfolk NR16 2LR, UK. Pp. 19 - 23.
- Zenebe, S. and Fekade, T. 2004. The role of donkey pack-transport in the major grain market (Yihil Brenda) of Addis Ababa. <http://r4d.dfid.gov.uk/PDF/Outputs/R7350b.pdf>. 7 pp.

Table 1: Reasons for keeping the donkey

Reason	Number of respondents
Transport	91
Manure	2
Ploughing	4
Meat	0
Cash	3
Total	100

Table 2: Age groups of respondents and number of donkeys owned

Age group	Sex of donkey		Total number of donkeys	Percentage (%)
	Jack	Jenny		
21 - 30	4	0	4	3
31 - 40	27	2	29	24
41 - 50	51	7	58	49
51 - 60	15	6	21	18

61+	5	2	7	6
Total	102	17	119	100

Table 3: Households mean annual income from various livelihoods

Source of livelihood	Mean annual income per household (US\$)	Percent contribution (%)
Donkey	217.78	18.8
Crop farming	308.42	26.6
Animal rearing	156.40	13.5
Building	4.22	0.4
Corn Mill Operation	108.36	9.3
Butcher	0.00	0.0
Sheabutter Extraction	6.83	0.6
Smock Weaving	11.44	1.0
Trading	77.67	6.7
Driving	0.00	0.0
Salary	136.53	11.8
Pito Brewing	6.56	0.6
Spinning	3.54	0.3
Groundnut Oil Extraction	6.06	0.5
Remittances from relatives	117.06	10.1
Total	1160.87	100.0

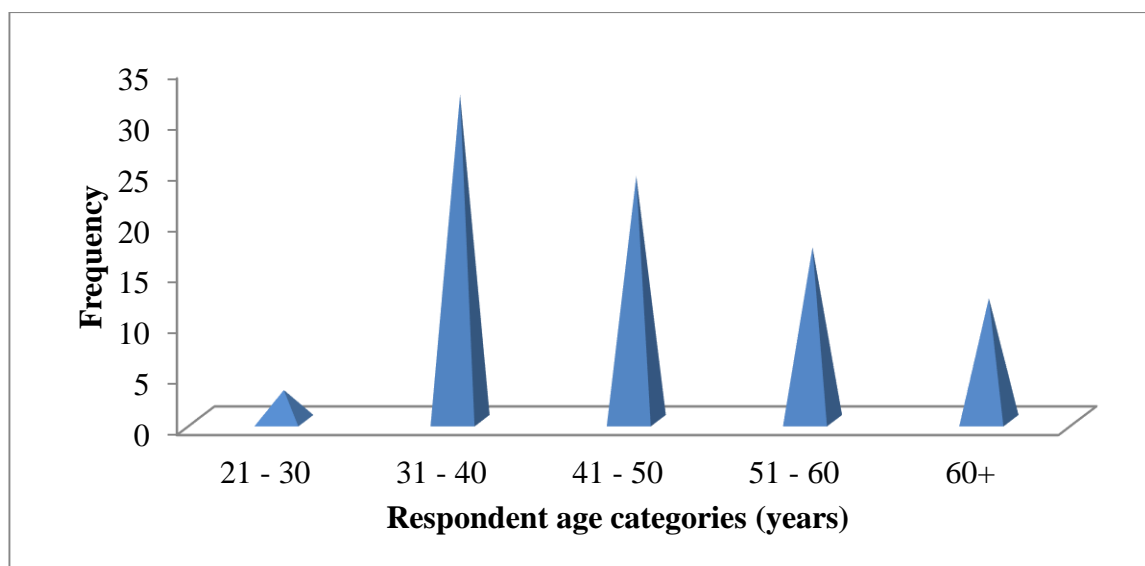


Figure 1: Age distribution of donkey owners

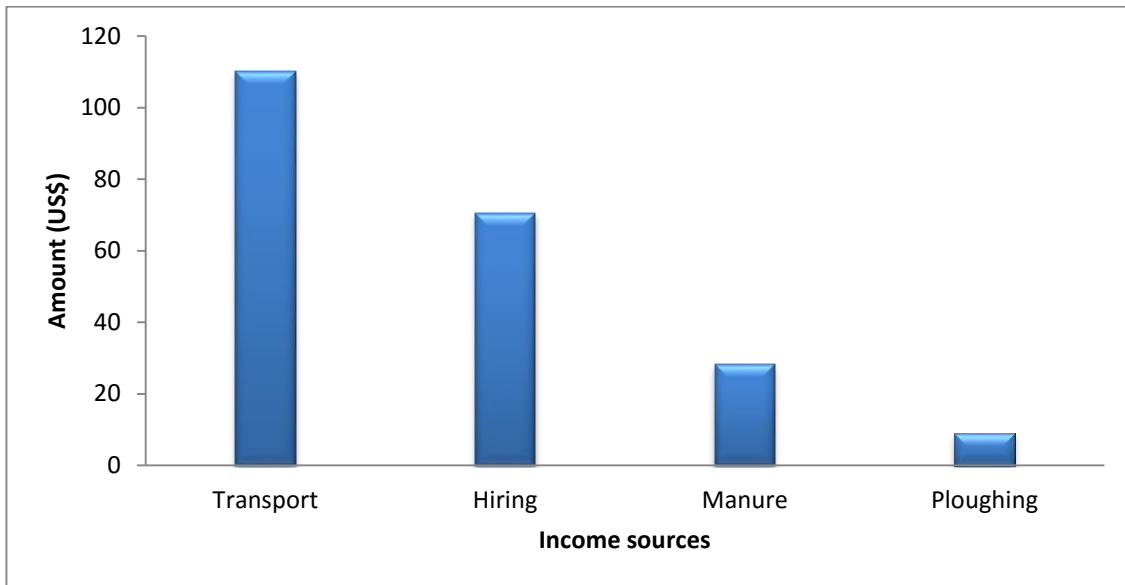


Figure 2: Income sources from the donkey