Socio-economic Values and Performance of Zebu Cattle Indigenous in Ukerewe and Bunda Districts of Tanzania

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Abstract

Socio-economic values and performance of indigenous cattle were compared between Ukerewe and Bunda districts. Crops and livestock were among major sources of income and food for households in the study area, but fishing was another significant source of income and food in Ukerewe than Bunda. Fishing was reported as important source of income and food by 22.4% and 18.5% of the respondents in Ukerewe and Bunda districts respectively. Forty six purposively selected households were interviewed on socio-economic attributes. Body weights from adult cattle owned by randomly selected 169 households were taken. Data were analyzed using ANOVA procedures of SPSS programme. Frequencies and crosstabs were generated and analysed. With the exception of sheep whose importance was low and restricted by social-cultural factors in Ukerewe, generally cattle numbers were higher (about 12.6 higher) in Bunda than in Ukerewe. Cattle were ranked the first in importance among livestock in both districts and sheep were ranked second by 30% of the respondents in Bunda district only. Sheep were rarely kept in Ukerewe due to society beliefs. Cattle were valued more as draught animals in Bunda district of which 20.8% of the households had draught animals. In Ukerewe cattle was kept mainly for meat purpose. In general, all the socio-economic attributes of cattle studied

showed a significant association with households' purposes. Nonetheless Ukerewe cattle performance in terms of meat body conformation was superior over Bunda cattle. It can be conclude that indigenous cattle were highly valued by owners because of the ethnic socio-cultural values.

Key words: herd sizes, livestock ranking, shorthorn zebu, traditional uses

Introduction

Local communities have been the custodians of indigenous livestock breeds for many centuries and they tend to keep animals in a pure state as they fulfil religious, ritual and subsistence purposes (Kohler-Rollefson, 2004). From traditional herding of their stocks they have developed strains that suit their specific economic and cultural requirements. Indigenous knowledge from such communities provides the best preliminary information regarding identity of indigenous cattle breeds and breed preferences, which constitutes an important input for planning sustainable local breed development and conservation programmes. In the Lake Victoria basin area most of the inhabitants are agro-pastoralists who earn their income from selling crops and livestock (Odada *et al.*, 2006). Cattle which are one of the sources of income are however kept for many other purposes which vary from one location to another depending on community's ethnic origin among other factors (Ndumu *et al.*, 2008).

Cattle supply households with milk, meat, hides, skins and draught power, and play crucial role in coping with risk and providing livelihood options in case of climate unreliability as they can be sold at any time to generate cash for buying food (Krishna *et al.*, 2004). Relative to other livestock, cattle are often kept in large populations by the agro-pastoralists of the lake zone, and this suggests their high ranking in importance (Ngowi *et al.*, 2008). In the lake zone area of Tanzania, two indigenous cattle breeds namely "Ankole Sanga" and Tanzania Shorthorn Zebu (TZS) are commonly found in farmers' herds. The former makes a small group in the western sub-humid

part of the zone, while the latter is relatively big and highly dispersed in the eastern highly extensive semi-arid part. High diversity in cattle socio-economic values has been reported, but a little information on cattle strains owned by specific ethnic groups in Tanzania have been documented. In planning for sustainable breeding programms that can be implemented promptly it is necessary to have the information on such strains and relate them to the local uses and opportunities in traditional uses of such indigenous cattle rather than assuming to have same utilisation in all ethnic groups. Ukerewe district is an island, partly dominated by semi-arid conditions. The area is part of the Lake Victoria basin dominated by agro-pastoral system, where herding and use of cattle appears to be a bit different from the neighbouring districts like Bunda in this case. This study was therefore undertaken to compare socio-economic values of indigenous cattle between the neighbouring Ukerewe and Bunda districts, both lying within the Lake Victoria Basin area of Tanzania.

Materials and Methods

Study Area Description

The study was conducted in Ukerewe and Bunda districts both lying within the Lake Victoria Basin area of Tanzania. Ukerewe district is an island in Lake Victoria located between Longitudes 31° 30' and 32° 5' east and between Latitudes 1° 30' and 2° 20' south with mean altitude of 1409 meters above sea level. It covers an area of 6400 km². The district has mean annual temperature of 24.5°C and mean annual rainfall of 1350mm. Human population in Ukerewe is around 260,831 people and the number of livestock is 52,137 cattle, 32,836 goats, 226 sheep, 569 pigs and 231,779 chickens respectively (Ukerewe District Council, 2012). Bunda on the other hand lies between Longitude 33° 30' and 34° 5' east, and between Latitude 1°30' and 2°45' south. The district is situated at an altitude of 1300 metres above sea level and has a total area of 3,088 km². Annual mean rainfall for Bunda district is 940 mm and the mean temperature is 28.5ºC. Bunda district has a total human population of 361,598 people whereas numbers of

livestock is 221,474 cattle, 77,593 goats, 49,287 sheep, 53 pigs and 6,245 chickens (Bunda District Council, 2012).

Data Collection

In order to strike a balanced representation of ecological zones, purposive multistage sampling was applied. This was done by selecting from each district two divisions with best representation of agro-ecologic condition and high population of livestock, then two wards from each selected division, and lastly two villages from each selected ward. At each sampled village only households that have been keeping indigenous cattle for at least 10 years were identified and enlisted into a sampling frame from which a total of 46 households (23 from each district) were randomly selected for interview. The interview covered on household sources of income and food, numbers of livestock kept, livestock ranking by socio-economic importance, usage of indigenous cattle and performance of cattle in terms of age at first calving, calving interval and lifetime number of calving. In addition, 169 fully adult (6 years or more for bulls and non-pregnant cows which have calved at least twice) indigenous cattle were randomly picked from among the respondents' herds (2-5 cattle per household) for estimating live weight from heart girth using weigh band. The estimation of live weight from heart girth was done according to the procedure described by FAO (2011) and measurements were recorded to the nearest 0.5 kilogramme. District profile data were obtained from respective District Agriculture and Livestock Development Officers (DALDOs).

Data Analysis

Data were coded and entered into excel spreadsheet before analysing using IBM SPSS version 20 computer programme. Frequencies procedure of Descriptive Statistics option was used to generate frequencies and percentages for sources of income and food, livestock ranking and usage of indigenous cattle whereas crosstabs procedure was used to test association of the variables between and within districts. One-way ANOVA procedure of comparing means

option was used to generate and compare means for livestock types kept for meat and milk production and reproductive performance levels of cattle between the districts under the study.

Results and Discussion

Livestock Kept

Diversification of use in livestock was found to be common in both districts. However there were considerable differences in types and number of livestock kept per household (Table 1). This was in agreement with the findings by Ndumu *et al.* (2008) who concluded that the reasons behind diversifying of livestock is due to widening scope of utilities which are derived from the wide range of livestock types. The significant part of diversification in this study was a resilience enhancement strategy, as it ensures earning of at least something from the risky farm production conditions thus a farmer can exploit the varying production potentials and adaptive capacities of livestock in the area (Smith, 2007). In this study livestock numbers were significantly ($p < 0.05$) higher in Bunda district than in Ukerewe district. The average herd size was 67.3 in Bunda district while it was only 5.3 for Ukerewe district.

The dominant position of cattle which was reported by Ngowi *et al.* (2008) was evident across the study area. This study also recorded similar ranking for goats which in overall ranked second with an average number of 30.1 in Bunda district which was seven times higher than that in Ukerewe (4.3). This could be probably due to geographical location where Ukerewe district by virtue of having a large area of lake body, it has a greater potential for fishing than Bunda district and this could be the cause of lowering farmers' dependence on livestock in Ukerewe than in Bunda (Smith, 2007). This is because herd and flock sizes are known to increase the household dependence on livestock for livelihood in most Sub-Saharan Africa traditional systems (IIRR, 2013). It is also possible that the farmers in Ukerewe are compelled to keep few livestock because of limited grazing land that favours livestock keeping. It was surprisingly to note that sheep were scantly found in Ukerewe.

Sheep were the third most numerous livestock species kept in Bunda where the average number kept per household was 29.9. However, the low sheep numbers in Ukerewe was suggestive of a particular socio-cultural factor which limited sheep production in Ukerewe district. Nonetheless, the population means of chickens in the two districts were not significantly (p > 0.05) different. This indicated the consistency of the roles chickens play in local communities in the developing world most probably resulting from few restrictive religious and social taboos against it (Smith, 2007). Nonetheless, household livestock ownership differed remarkably between the districts especially with regard to herd and flocks sizes and the differentiation could be linked mostly to variation in potentialities harnessed in fishing as an economic activity and somewhat to livestock products utilization cultures (Ndumu *et al.*, 2008).

Table 1: Least Square Mean ± se for Numbers of Households Keeping Livestock in Ukerewe and Bunda

Species	Ukerewe	Bunda
Cattle	5.3 ± 4.3^b	67.4 ± 63.4^a
Goats	4.3 ± 3.0^b	30.1 ± 20.3^a
Sheep	0^b	29.9 ± 29.5^a
Chicken	10.7 ± 8.2^b	14.2 ± 8.7^a

Note: se = standard error. Least square means with different superscripts within a row are significantly different at $p \leq 0.05$

Livestock as a Source of Household Income and Food

The role of   livestock as a source of household income and food is shown in Table 2. In Ukerewe and Bunda, crops and livestock were regarded as the leading sources of income by 37.3% and 44.9% of the respondents, respectively. The results are in agreement with those reported by Ngowi *et al.* (2008) who reported more or less similar results for neighbouring districts within the Lake Victoria basin area. Fishing being mentioned by 18.5% of the respondents was the third important source of income in Ukerewe and for that reason its position as a source of income cannot be neglected (Odada *et al.*, 2006). Despite the fact that fishing as income source was not reported

at all in Bunda, however it was mentioned as source of food as protein. In Ukerewe district, crops were reported by 39.7% of the respondents as source of income whereas livestock was reported by 37.9% and fishing by 22.4%. In Bunda district crops and livestock was regarded as the main sources of both food and income by 48% of the respondents, while only 4% reported fishing as their main source of food and income. As food being a prime welfare indicator in traditional systems, these findings are in agreement with the conclusion by Kohler-Rollefson (2004) that livestock in developing world fulfils subsistence purposes.

The significant association between districts and the sources of income and food indicated existence of real differences between ranking positions which livestock have as sources of income and food. This possibly stem from positions of fishing which varied remarkably between the locations in conformity to the projection from a geographical perspective that was made previously. It is due to the fact that income and food have economic relevance, this makes the likelihood that owners of the cattle have been selecting animals for the economically related traits and possibly more genetic gain achieved from such selection in Bunda district and Ukerewe district cattle. In this regard, the observed famer values on their cattle are of suggestion that the cattle in Bunda district are genetically superior to those in Ukerewe district interms of draught power whereas Ukerewe district cattle being superior to those in Bunda district in meat qualities.

Table 2: Frequencies and Percentages of Sources of Income and Food in Ukerewe and Bunda Districts

Source	Ukerewe		Bunda	
	n	%	N	%
Income				
Fishing	11	18.5	0	0
Crops	22	37.3	22	44.9
Livestock	22	37.3	22	44.9
Salary	4	6.7	2	4.1
Business	1	1.7	3	6.8

$\chi^2(4, 0.05) = 11.56*$

Food				
Fishing	13	22.4	2	4.2
Crops	23	39.7	23	48.0
Livestock	22	37.9	23	48.0

$\chi^2(2, 0.05) = 7.1*$

n is the number of observations

Livestock Species Importance Ranking

Results for importance of livestock ranking according to socio-economic criteria are presented in Table 3. It shows that 34% of the respondents in Ukerewe district and 27.7% of the respondents in Bunda district ranked cattle as first priority. However, chickens were ranked first by only 1.5% of respondents in Ukerewe district. Furthermore, cattle were ranked the second by only 1.5% in Bunda district. The high rank which cattle have among livestock types in the study area was also reported by Ngowi *et al.* (2008). A prominent difference with regard to livestock ranking by farmers of the two

districts was for sheep in Bunda district where it was ranked second by 30% of the respondents.

Table 3: Frequencies and Percentages of Livestock Ranking in Ukerewe and Bunda Districts

Species	Rank	Ukerewe		Bunda	
		n	%	N	%
Cattle	1	22	34.4	23	27.7
	2	1	1.5	0	0
Goats	2	15	23.4	16	19.3
	3	3	4.7	2	2.4
Sheep	2	0	0	6	7.2
	3	0	0	14	16.9
Ducks	3	2	3	0	0
Chicken	1	1	1.5	0	0
	2	5	7.8	2	2.4
	3	13	20.3	2	2.4
	4	1	1.5	18	21.7
Pigs	3	1	1.5	0	0
$\chi^2(3, \ 0.01) = 14.4**$					

n is the number of observations

Whereas, in Ukerewe sheep were completely not considered for keeping. This finding could be suggestive of the Ukerewe community lacking cultural values and uses in rituals and consumption of mutton by the Kerewe and Kara ethnic groups that are more used to fish consumption. This was justified by the significant association between ranking and location observed that attributed to differences in ranking position of sheep between the

study districts. As far as the issue of farmer values on livestock is concerned, Bunda was therefore one of the districts promising for implementing sheep breeding programmes.

Use of Indigenous Cattle

Indigenous cattle were found to have various uses (Table 4). Across the study area the highest proportions (45.6% in Ukerewe district vs 29.2% in Bunda district) of the respondents reported that livestock were for income generation. Another 31.8% of the respondents in Ukerewe district and 23.7% in Bunda district mentioned milk for household consumption to be the most important use of cattle. Draught power was reported as the major use of indigenous cattle by 20.8% of respondents in Bunda district while it was not reported at all in Ukerewe district. The association between location and uses of indigenous cattle was found to be significant (p < 0.05). The study

Table 4: Uses of indigenous cattle in Ukerewe and Bunda

Function	Ukerewe		Bunda	
	n	%	N	%
Meat	1	2.2	5	6.9
Milk	14	31.8	17	23.7
Draught power	0	0	15	20.8
Income	20	45.6	21	29.2
Manure	9	19.6	4	5.6
Prestige	0	0	4	5.6
Dowry payment	0	0	6	8.3
School fees	0	0	1	1.4
Rituals	0	0	1	1.4

$\chi^2(8, 0.01) = 26.3^{**}$

n is the number of observations based on multiple responses has therefore revealed the widely reported fact that indigenous cattle are kept for multiple uses of which income generation is considered to

be the most important by their owners. One important implication behind this finding is that in designing breeding programmes in the study area multiple objectives will need to be put into consideration.

Performance of Indigenous Cattle

Table 5 summarises the results on performance of the zebu cattle indigenous in the study area. It is shown that cattle in the two districts don't differ significantly with regard to calving interval and lifetime number of calving. Cattle in Ukerewe district however were observed to have significantly heavier body weights at maturity and lower age at first calving than those in Bunda district. Performances exhibited in fertility traits were more or less similar whereas for growth traits Ukerewe district cattle showed a bit higher performance (60%) than Bunda district cattle (57%).

Although performance of these indigenous animals was low, it was noted that farmers had deep social cultural values to their indigenous cattle irrespective of their performances. As such in implementing within herd's selection programmes, it could be better to target only those communities which can value selection for potential productive traits. However, traits like body weight and age at first calving are highly influenced by environment and management (Williamson and Payne, 1965) and the superiority exhibited in Ukerewe district over Bunda district cattle is likely to be due to more productively favourable environmental and management conditions in Ukerewe district compared to Bunda district.

Table 5: Least square means ± se for performance traits of cattle in Ukerewe and Bunda

Trait	Ukerewe	Bunda
Body weight at maturity (kg)	227.9 ±4.7a	212.5 ±4.4b
Age at first calving (months)	43.8 ±6.0b	45.9 ±9.3a
Calving interval (days)	458.3 ±33.4	448.3 ±34.1
Lifetime number of calving	5.6 ±2.1	6.7 ±2.0

Note: se = standard error. Least square means with different superscripts within a row are significantly different at p ≤ 0.05

This might be because in Ukerewe heat stress is lower and herbage is more available to animals than in Bunda district. Again movement for search of pasture is lower in Ukerewe district due to tethering than in Bunda district. This suggests that Bunda district cattle possibly are more adapted to harsh environmental and management conditions than Ukerewe district cattle. It is also possible that because draught power is an important purpose for keeping cattle in Bunda district. The farmers in Bunda district have been selecting potentially growing male calves for oxenization rather than for meat and through that selection thus slowly growing pedigree population.

Conclusion

The study has revealed considerable differences in socio-economic values and performance of indigenous cattle between locations under the study area. Livestock kept in the study districts were more or less of similar types in terms of species, except for sheep which were not that much prominent in Ukerewe district. For the livestock found in both districts, numbers were higher in Bunda district compared to Ukerewe district. Cattle were found to be an important source of income and food in both locations but usage of cattle for draught power was observed to be conspicuous in Bunda district

only, whereas fishing emerged as a significant source of income and food in Ukerewe district. Furthermore, the use of cattle as a source of income and food were higher in Bunda district than Ukerewe district.

On the other hand Ukerewe district cattle were found to be superior over Bunda district cattle with regard to age at first calving and body weight at maturity, of which it was an attribute from selection for meat contrary to Bunda where selection concentrated to draught power traits and for enduring hardships in production environment in Bunda district. The study has elucidated the possibility of Bunda cattle to have genetic superiority on draught animal power and Ukerewe district on growth for meat production traits and therefore highly valued as a source of income, food and drudgery alleviation purposes to the livestock farmers. Rigorous production environment being faced by animals in Bunda district entails the development of adaptation in such harsh environment. So, indigenous cattle were found to be socio-economically highly valued by their herders and the values disregarded their performance in a particular location. Therefore, as they are used for various socio-cultural functions the indigenous cattle were highly valued by their owners.

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