Tropentag 2007
University of Kassel-Witzenhausen and
University of Göttingen, October 9-11, 2007
Conference on International Agricultural Research for Development

Urban and peri- urban farming systems and utilization of the natural resources in the North Ethiopian Highlands

Yitaye Alemayehu Ayenew[1,2], Maria Wurziger[2], Azage Tegegne[3] and Werner Zollitsch[2]

[1]Amhara Regional Agricultural Research Institute (ARARI), Bahir Dar, Ethiopia

[2]University of Natural Resources and Applied Life Sciences (BOKU), Department of Sustainable Agricultural Systems, Division of Livestock Sciences, Vienna, Austria
[3]International Livestock Research Institute (ILRI,) Addis Ababa, Ethiopia

Key words: livestock, dairy cattle, urban agriculture, peri-urban agriculture

Introduction

Today urbanisation is advancing at a much more rapid rate than ever. A report of the World Bank (1989) revealed that, by the year 2025 the urban population of sub-Saharan Africa would be growing at 6.9% per annum as compared to 3.1% of the total population of the region. Consequently, in 25 years time about 55% of the region's people will live in towns and cities compared to 30% currently (Winrock International, 1992). This great population pressure in and around cities, coupled with the economic crises throughout the region has led to a tremendous increase in the last decade of total city area under food production. This activity is known as urban and/or peri-urban agriculture. Urban and peri-urban agriculture is practised for a variety of reasons, from commercial reasons to food self-sufficiency to food security.

However, the important aspects and limitations of the different farming systems in the urban and peri-urban areas of North western Ethiopia were not yet well studied and documented. Among them, the level of integration, the limitations and the advantages of farming systems seem to be most important. For example the dependency of farmers on animal power for traction (soil seed-bed preparation, trashing and transportation of agricultural and non-agricultural goods) and on livestock manure for fertilizing crop land may pose significant limitations on farming activities in urban and peri-urban areas.

Therefore, the objectives of the current project were to asses the level of integration of crop-livestock farming and to evaluate the advantages and disadvantages of livestock and crop-livestock farming systems in urban and peri-urban areas of North western Ethiopia.

Materials and Methods

The study was carried out between July 2006 and March 2007 in two districts of the Amhara region, Ethiopia, Bahir Dar town and Dangla, about 580 and 500 km northwest of Addis Ababa, respectively.

Method of Data Collection

A total of 54 urban and peri-urban farmers keeping dairy cows were selected from two locations by use of systematic random sampling techniques. Therefore, a total of 54 farmers were interviewed from the main city of the Amhara Region (Bahir Dar) and from the secondary towns

Dangla and its vicinities. A structured questionnaire was prepared, translated into the local language and pre-tested to collect information from urban and peri-urban dairy farmers[1].

Data Analysis

Descriptive statistics of SAS (2002) was used to describe the farming system characteristics such as family size and composition, land use pattern, crop yield per hectare, and herd size and composition. Interactions between farming system characteristics were also analysed by use of the General Linear Model (GLM) of the SAS (2002) statistical package.

Result and Discussion

Family Size and Composition

The average family size per household varied between urban and peri-urban areas. The average family size for urban area was 5.6 people ranging 2-10 and 7.8 people ranging 2-19 for peri-urban area people per household, respectively. The main source of labor to the farming community was the family. Hence, having many family members seems to be considered as an asset and a security in times of retirement. This might be the reason why the average household size was higher for peri-urban areas where 55.6 % mixed farmers were found.

Eleven percent of the households were observed to be headed by female, while 89% of the household head was male. The largest age group of the household was the group of 16-30 years (33.8%). This group might provide better labour input for farms. People above 60 years represented the smallest group (7.1%).

Land Use Pattern and Farming Systems

With only 25 of the interviewed farmers owning land (on average 3.3 ha), integrated farming is mainly found in peri-urban areas (Table 1). In urban areas, where 75 % of the farmers do not have access to land, livestock farming and especially dairying is the main agricultural activity. In the study areas, the proportion of land allocated for annual food crop production was 52.7 %, for perennial crops 9%, for private grazing 34.7% and for cultivated pasture land 3.6% of the total farm land. This implies that a large proportion of farm land was allocated to crop production. This is in agreement with reports of CSA (2003). In general, the decline in grazing land has become one of the most important causes of feed shortage and drop in livestock productivity (Agajie et al., 2001).

Table 1. The proportions of farmers engaged in different farming sub-system by district

Location	Livestock farming		Crop-livestock farming	
	number of farmers	%	number of farmers	%
Uraban	24	88.9	3	11.1
Peri-urban	12	44.4	15	55.6
Total	36	66.7	18	33.3

The average area of crop land differed significantly ($p<0.001$) between farming systems (2.4 and 0.3 ha for crop-livestock farmers and specialized livestock farmers, respectively), but no significant ($p>0.05$) difference was found between locations. The average cultivation pasture land of urban area was 0.3 ha and found to be significantly ($P<0.05$) higher than that of peri-urban area which was on average 0.07 ha. There was no significant ($p>0.05$) difference between the two farming systems.

[1] In this paper urban farming includes those farmers found with in the main regional town called Bahir Dar and peri-urban includes those undertaking farm activities in the secondary towns named Dangla and its vicinities.

Livestock ownership

The number of livestock owned by the respondent farmers varied between locations and the farming system (crop-livestock and livestock farming) depending on several factors such as feed availability, disease condition and objectives of livestock raising. An average number of 14.2 livestock (73.3% cattle, 22.1% sheep, 1.1% goats and 3.4% equines) and 2.8 poultry were kept per household. In the study area, the predominant cattle type includes pure indigenous Zebu and crossbreds (Zebu*Holstein Friesian, 68.2 %), the latter being mainly found in the urban areas (57%). However, a significantly greater number of crossbred cows were kept on farms located in urban areas (3.9) and practising crop-livestock production (3.5), respectively, as compared to other farms.

In general, the number of local cattle was higher in the peri-urban than urban areas. The greater number of crossbred cattle in the urban area might be due to the relatively better level of management that can be observed there.

No horses and only low numbers of local oxen were found in the urban area as well as in sole livestock farming system, probably because of the little need for transportation and practices such as threshing and ploughing in the urban area where farmers practise dairying only.

Feeding Management

The major sources of livestock feed in the study areas were natural pasture, hay, crop residues and concentrates (noug cake and wheat bran). The report of Agajie et al. (2001) on agro-ecologically similar area of north and west Shewa zone showed similar results. However, feed availability is becoming a critical factor determining livestock production. Farmers reported that, more pasture and grazing lands were being cropped leaving unproductive marginal areas for grazing. To minimize the feed shortage farmers were forced to shift on to crop residues, similarly as was reported for the Hararghe (Eastern part of Ethiopia; Fekadu and Alemu, 2000). Hay was found to be an important feedstuff especially for crossbred cows in all farms and for oxen mainly in mixed farming systems. The vast majority of the farmers (94.4 %) use oil seed cake (noug cake), while wheat bran and maize grain were available to 63% and 14.8 % of the farmers, respectively. A local brewery by-product was also used by 50 % of the farmers.

Table 2. Grazing management of urban and peri-urban farmers (%) in different season of the Year

Description	Grazing system	Dry season	Rainy season
Calves	open grazing	20.7	22.6
	rotational grazing	7.5	7.5
	cut and carry	71.7	69.8
local cows	open grazing	76.2	70
	rotational grazing	0	0
	cut and carry	23.8	30
crossbred cows	open grazing	22.6	19.6
	rotational grazing	3.7	5.8
	cut and carry	73.6	74.5

Due to the high number of livestock grazing in one area, open grazing which is predominant for local cows probably contributes to substantial soil erosion because of overgrazing. On the other hand, having crossbred cattle obviously encourages farmers to use a zero grazing system for feeding (Table 2).

Such management differences showed also difference on milk yield performance of cows. The milk off-take per day from local zebu cows was around 2.2 litre with the range of 1 to 4, while for crossbred cows the mean was 7 litre ranged from 1 to 13.3.The lowest value for daily milk yield

(2 litre) of local cows was observed in peri-urban farms, while in urban farms it was 2.6 litre. Moreover, the lowest value of mean daily milk yield for crossbred cows was observed in peri-urban farms (6.7 litre) and in urban farm, it was 7 litre per day. Milk off-take from local Zebu and crossbred cows was around 355.8 and 955.7 litres per cow per lactation period, respectively.

Crop-livestock Integration

Crop-livestock integration plays a vital role in the small holder farming systems. In the study areas, about 33.3 % of the respondents were crop-livestock farmers (Table 1), where the two farming systems interrelate with each other: livestock is a living bank for many farmers and play a critical role in the agricultural intensification process by providing draft power for land preparation and manure to improve soil fertility. All crop-livestock farmers use oxen to cultivate their land, livestock is also used to thresh during crop harvest and transport of agricultural and no-agricultural goods from and/or to the homestead and the field or market places. The sale of livestock and livestock products provided cash to buy agricultural inputs (fertilizer, seed, herbicides and farm implements) (Yitaye A., 1999).

The overall contribution of crop and livestock farming to family income is around 57.4%. The contribution of agriculture to the yearly income of crop-livestock farmers is significantly ($p<0.001$) higher than is found for pure livestock farmers (89.4% as compared to 43.3%).

Fallowing and crop rotation are rare in the study areas and the cost of synthetic fertilizer is beyond the purchasing power of farmers. Hence, livestock manure plays a major role in maintaining fertility and structure of the soil: an average amount of 7.2 tons of dried manure per household was estimated to be annually produced. The manure is mainly used for fertilizing crops and as fuel in the peri-urban and urban areas, respectively.

On the other hand, the by-products from crops play a vital role as feedstuffs. Moreover, about 14.8 % farmers were observed to provide maize grain as a supplement mainly for lactating cows. 50 % of the farmers were found utilizing a local brewery by-product made from maize, wheat and barley grains.

Conclusions

It is concluded that small holder crop-livestock farmers could benefit from efficient utilization of crop residues for animal feed and manure for crop production. Moreover, zero grazing could be one important option for efficient utilization and conservation of the natural resources.

References

Agajie Tesfaye, Chilot Yirga, Mengistu Alemayehu, Elias Zerfu and Aster Yohannes.2001. Smallholder livestock production systems and constraints in the Highlands of North and West Shewa zones. In: Livestock in Food Security – Roles and Contributions. Proceedings of the 9th annual conference of the Ethiopian Society of Animal Production (ESAP) held in Addis Ababa, Ethiopia, 30-31 August 2001. ESAP, Addis Ababa, Ethiopia.

CSA. 2003. Central Statistical Agency of Ethiopia. Agricultural sample enumeration 2001/02 results for Amhara region household and land use**.** Addis Ababa, Ethiopia.

Fekadu Abate and Alemu Yami. 2000. The feed resource base and feeding management of the traditional draught oxen fattening practice by smallholder farmers in the eastern Hararghe highlands. In: Livestock production and the environment-implications for sustainable livelihoods. Proceedings of 7th annual conference of Ethiopian Society of Animal Production (ESAP) held in Addis Ababa, Ethiopia, 26-27 May 1999. ESAP, Addis Ababa, Ethiopia.

SAS. 2002. User Installation Guide for the SAS System Version 9.1 (SAS Institute Inc., Cary, NC, USA.)

Winrock International. 1992. An assessment of animal agriculture in Sub-Saharan Africa. Winrock International, Morrilton, USA.

World Bank. 1989. Sub-Saharan Africa: From crisis to sustainable growth.. World Bank, Washington D.C.

Yitaye Alemayehu. 1999. A study on livestock production systems, feed resources and feed allocation practices in three peasant associations of the Awassa woreda, southern Ethiopia. M. Sc. Thesis, Alemaya University of Agriculture, Alemaya, Ethiopia.