



Available online freely at www.isisn.org

Animal Science Journal

Print ISSN: 2220-9549 Online ISSN: 2220-9557

Journal by Innovative Scientific Information & Services Network



REVIEW ARTICLE

ANIMAL SCIENCE JOURNAL, 2021 12(1):28-33.

OPEN ACCESS

Contribution of small ruminant production in food and economic security: A Review

Tarekegn Derbib

Mekdela Amba University, College of Agriculture and Natural Resources, Department of Animal Science, Tulu Awulia, Ethiopia

*Correspondence: mule099.td@gmail.com Received: 29-06-2021 Revised: 10-12-2021 Accepted: 12-12-2021 Published online: 22-12-2021

The main objective of this review paper is to identify and characterize the numerous roles that small ruminants attribute for the well beings of humankind, rural development, especially for rural communities. Sheep and goats are widely adapted to different climates around the world and are found in all production systems. They also have lower feed requirements compared to other livestock because of their small body size. This allows easy integration of small ruminants into different farming systems. Human population growth in different parts of the world has been forcing the conversion of many former grazing areas into croplands needed for increased food production. However, the increase in human population result in the increase the demand for sheep and goat meat in turn also increased their importance in lowland pastoral areas as a source of cash income, food security. Small ruminants play very important economic and socio-cultural roles for the wellbeing of rural households, such as food supply, source of income, asset saving, source of employment, soil fertility, livelihoods, agricultural diversification and sustainable agricultural production. The social functions correspond to the symbolic values and the use of animals for the fulfillment of a set of rituals and social obligations of families and communities. Small ruminants gives social status to its owners once it is considered a common mean of demonstrating wealth and provides economic status as it facilitates the access to informal credits and loans to the households. Also used in traditional rituals, ceremonies and festivities and is given as a gift in worships.

Keywords: Contribution, Economic Security, Food Security, Role, Small ruminant

Sheep and goats have been economically, nutritionally and culturally very important to mankind for over 7000 years (Aziz, 2010). Rearing of small ruminants like sheep and goats would have lasting effects in bringing about social change by improving the incomes of these people. The ruminants provide their owners with a vast range of products and services. Very often, there are no banking facilities in rural areas and an easy way to store cash for future needs is through the purchase of sheep and goats (IBC, 2004).

In Ethiopia, agriculture in general and livestock in particular play pivotal roles in the nation's economy. The majority of the population depends upon agriculture for their livelihoods. Livestock are an integral component of the farming systems present in Ethiopia; cattle, horses, donkeys, sheep and goats serve various functions from supplying draught power to meat and milk production to serving as a source of savings (Tilahun, 1994).

Small ruminants are of economic importance to

small-holder farmers and especially women. The total income share of small ruminants tends to be inversely related to size of land-holding, suggesting that small ruminants are of particular importance for landless people especially women. In some cultural settings, women are often not entitled to own land and since agriculture (crop production) provides only seasonal employment, rearing small ruminants would provide employment and income as a subsidiary occupation. Livestock are often regarded as producers of milk and meat, income generators, and reservoirs of wealth (Coppock et al, 2006). In fact, in some areas, small ruminants have been described as the 'village bank'. From the foregoing, small ruminants play an important role in ensuring rural women's financial security and data supports (Maxwell, 1990) that women are better managers of household resources than men. Thus, an improvement in the financial security of rural women through rearing small ruminants would inevitably translate to better living conditions for households.

Small ruminants are often preferred over large ruminants. However, the real importance of individual species is dependent on the total population of individual species and also the extent of their development. Goats and sheep are conveniently cared for by unpaid family labor (women and children), occupy little housing space and supply both meat and milk in quantities suitable for immediate family consumption. Their potential value in less developed countries has been emphasized (Devendra, 1980). In Latin America, the importance of small animals over large animals in small farms is being advocated in order to alleviate the serious economic and nutritional predicament of small farmers and their families (Huss, 1982).

Small ruminant production system

Globally, numbers of cattle, goats, and sheep increased from 1979 to 2009; with percentage increases of 14 % (cattle), 93 % (goats), and 1 % (sheep) (FAO, 2011). Livestock production system and the relative importance and potential for increased production by livestock species in varied areas differ markedly due to differences in resource endowment, climate, population, disease incidence, level of economic development, research support and government economic policies (Beets et al., 1990). In Ethiopia, sheep and goats are maintained under two broad production systems (Tembely, 1998; EARO, 2000).

Mixed crop-livestock farming system

In the central highlands of Ethiopia small ruminants depend mostly on grazing fallow lands, overgrazed natural pasture and crop residues usually with no extra-supplement and receive minimum health care. Farmers maintain one to three rams (depending on the size of the flock) for year round breeding (Tembely, 1998). Productivity is low and is under nutritional stress for much of the year due to cropping intensity (EARO, 2000).

Agro pastoral and pastoral system

Small ruminant production is associated with the purely livestock based nomadic and transhumance pastoral production systems based largely on range, primarily using natural vegetation. In the lowlands of Ethiopia, livestock is comprised of large flocks and herds of sheep and goats, cattle and camels mainly transhumants, where only surplus are sold at local markets or trekked to major consumption centers. Extensive livestock keeping is the backbone of the economies of the lowlands (EARO, 2000).

Livestock production systems in Ethiopia have evolved largely as a result of the influence of the natural production environments and socio-economic circumstances of farmers/pastoralists, rather than market forces. Livestock production is of subsistence nature. Like all other livestock species, sheep and goat in Ethiopia are kept under traditional extensive systems with no or minimal inputs and improved technologies, which results in characteristically low productivity (Solomon G. *et al*, 2010). They are virtually kept as scavengers, particularly in the mixed crop-livestock systems. Sheep and goat are largely produced in mixed crop-livestock, specialized pastoral and agro-pastoral systems. Market-oriented or commercial production is almost non-existent. Small flock sizes predominate in the highland mixed crop-livestock systems because of land and capital limitations. Relatively larger flocks are maintained in the lowland (agro) pastoral systems (Solomon G. *et al*, 2010)

General Advantages of small ruminant

Small ruminants, in common with other ruminants, can convert low quality fibrous feeds to high quality products. Moreover, certain characteristics of sheep and goats bear special mention because of their relevance to agricultural development efforts. Their small size, early maturity and low capital investment per head particularly suit them to the needs of limited resource producers. They often contribute needs of household for cash

income and food, in small but timely amounts. They can range over wider areas, select a larger variety of plants, and repopulate faster than large ruminants after droughts (World Bank, 1983).

Sheep and goats are highly adaptable to a broad range of environments. Certain breeds of sheep and goats are tolerant to diseases and parasites such as helminthosis (Rege, 1993). Sheep and goats have short generation cycles and high reproductive rates which lead to high production efficiency. Goats are more effective at selective grazing and the efficiency of converting feed into milk is higher than in other dairy animals (Rege, 1993). Sheep and goat are easy to handle and generally require little input. Sheep and goat production does not require elaborate facilities and equipment. Sheep consume roughage as their primary feed and help control weeds. Sheep provide two sources of cash income: lamb and wool. Sheep require a minimum amount of supplemental feeding and Sheep and goat can provide a quick return on investment.

The small size of sheep and goats has distinct economic, managerial, and biological advantages. Low individual values mean a small initial investment and correspondingly small risk of loss by individual deaths. They occupy little housing space, lower feed requirements, and supply both meat and milk in quantities suitable for immediate family consumption, which is important in view of lack of means of preservation (Ibrahim, 1998). For similar reasons, Dinksew and Girma (2000) reported that sheep production is becoming a viable alternative for urban production considered as a means to fulfill parts of home consumption and income needs during severe shortage of cash.

Contribution of small ruminant in food security

Food security has been defined as all people, at all time, having physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Clay, 2002). Household food security is the application of this concept to the family level, with individuals within households as the focus of concern. Dimensions of food security are availability, accessibility, utilization/nutritional value and stability (John et al., 2013). Food insecurity and malnutrition are major challenges. The five African countries with the most number of people in a state of hunger or malnutrition are Ethiopia (32.1 million), Tanzania (15.7 million), Nigeria (12.1 million), Kenya (11 million), and

Uganda (10.7 million) (Africa food security and hunger, 2014).

Sheep and goats are widely distributed and adapted to a wide range of environmental diversity (EARO, 2000; Ibrahim, 1998). They are of great importance as major sources of livelihood (Tembely, 1998) and contribute to the sustenance of landless, smallholder and marginal farmers especially to the poor in the rural areas throughout the developing countries. Small ruminants make an important contribution to household food security. The annual estimate of sheep and goat consumption in Ethiopia is 1,078,000 and 1,128,000, respectively (Hirpa and Abebe, 2008). Livestock directly contribute to human food security by transforming vegetation from non arable dry lands, crop residues, by-products from food processing, and organic waste into human food that is of high nutrient density and nutritional quality. Small ruminants thus offer one of the most efficient means of utilizing resources that would otherwise go unexploited, in both rural and urban areas (World Bank. 2008).

Small ruminant was ranked the most important livestock species, followed by cattle. Looking at the different gender groups, cattle were considered the most important livestock species by men in both categories, closely followed by sheep. Sheep were the most important livestock species in the highlands and goats in the lowlands. In the midlands, cattle were most important for women, men and youth men (H.D. Wodajo, *et al.*, 2020). The role of sheep and goats as a continuous source of protein during and immediately following a period of drought is one major reason for making them the most important component of livestock in pastoral and agro-pastoral production system.

Role of small ruminant in economic security (income generation)

Livestock are an important component of small holder farmer livelihoods in Ethiopia. Not only are they an important source of cash income, they also provide draught power, milk, meat, and manure and hides and skins. Livestock thus play an important role in alleviating poverty (Ehui et al., 2002). Small ruminants are generally considered a key asset for smallholders playing significant economic and cultural roles and reared in different agro-ecological systems in Ethiopia as studies showed in Alaba and Dale districts of Southern Nations Nationalities and Peoples Region.

The importance of small ruminants in income

generation and households' social and financial security are well established in literature (Zelalem, 1993; Baars, 1998; Workneh Ayalew, 2006). Small ruminants have a number of advantages for being an integral component of the pastoral production system. The small size of sheep and goats has distinct economic, managerial, and biological advantages. Economically, low individual values mean a small initial investment and correspondingly small risk of loss by individual deaths. Managerially, they are conveniently cared for by women and children, occupy little housing space, lower feed requirements, and supply both meat and milk in quantities suitable for immediate family consumption.

A study by Knipscheer *et al.*, (1983) indicated that the involvement of rural households in West Java in raising small ruminants is large. One out of every five farmers kept sheep or goats, and participation by farmers was as high as 30%. The contribution of goats and sheep to the total farming income is substantial

Moreover, sheep and goats are kept for a variety of economic reasons including savings and investment, security and insurance, stability, and social functions. Sheep and goats appear to withstand drought better than cattle, and their short reproductive cycle allows them to quickly recover from rapid resumption of breeding following drought or devastating disease infestation. In contrast to large ruminants like cattle which are normally concentrated and remain in the hands of a restricted number of producers (high income rural households), small ruminants are dominant in almost every low income rural household. In the dry areas of Northern Nigeria, fewer than 20 percent of farmers own cattle (ILCA, 1980). The ownership pattern characterizes the legacy of sub-Saharan Africa's rural economy as capital constraints limit access to cattle among poor households whilst small ruminants are well suited for their financial and labor resource capabilities.

In terms of Tropical Ruminant Livestock Unit, sheep and goats represent only 13% of the estimated total Ethiopian ruminant livestock population but contribute highly significant product (EARO, 2000). Sheep and goats provide about 12% of the value of livestock products consumed and 48% of the cash income generated at farm level, 46% of the value of national meat production, 25% of the domestic meat consumption with production surplus, 58% of the value of hide and skin production, 40% of fresh

skins and hides production and 92% of the value of semi-processed skins and hides (ILCA, 1993; Zelalem, 1993).

CONCLUSION

Globally, majority of the population depends upon agriculture for their livelihoods. Livestock are an integral component of the farming systems. Sheep and goats are widely adapted to different climates around the world and are found in all production systems.

Sheep and goats have been economically, nutritionally and socio-culturally very important to mankind. Small ruminants, in common with other ruminants, can convert low quality fibrous feeds to high quality products. Moreover, certain characteristics of sheep and goats bear special mention because of their relevance to agricultural development efforts. Their small size, early maturity and low capital investment per head particularly suit them to the needs of limited resource producers. In general, small ruminants play a great role in maximizing income generation thereby securing economic feasibility and meet food requirement and ensure sustainability of livelihood particularly of smallholder farmer's.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

ACKNOWLEDGEMENT

The review has not been funded by any financing agent and therefore did not receive any specific funding.

AUTHOR CONTRIBUTIONS

Tarekegn Derbib wrote the complete paper

Copyrights: © 2021@ author (s).

This is an open access article distributed under the terms of the [Creative Commons Attribution License \(CC BY 4.0\)](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author(s) and source are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

REFERENCES

Adane Hirpa and Girma Abebe, 2008. Economic Significance of Sheep and Goats

- Africa Food Security and Hunger, A, 2014. Undernourishment Multiple Indicator: Time Lag for Verifiable Comparable Information Across Countries 12 to 18 Months.
- Assefa, E., 2008. Assessment of Production and Marketing System of Goats in Dale District, Sidama Zone. MSc Thesis (Animal Production). Hawassa University 170 p. <https://hdl.handle.net/10568/697> (Accessed January 2021).
- Aziz, M.A. (2010). Present status of the world goat populations and their productivity. *Lohmann Information* 45(2): 42-52.
- Baars, R.M.T. 1998. Costs and return of camels and small ruminants in pastoral herds of Eastern Ethiopia. P. 162-175. In: Proceedings of the Sixth Ethiopian Society of Animal Production, 14-15 May 1998. A. Ababa, Ethiopia.
- Beets, W. C. 1990. Raising and sustaining productivity of smallholder farming systems in the tropics. A hand book of sustainable agricultural development. Alkmaar, Holland, AgBe publisher, 1800GC.
- Clay, E., 2002. Food security: concepts and measurement. *Trade Reforms and Food Security: Conceptualizing the Linkages*. pp. 25–34.
- Coppock, D. L., S. Desta, S. Tezerra and G. Gebru 2006. An Innovation System in the Rangelands: Using Collective Action to Diversify Livelihoods among Settled Pastoral Women in Ethiopia. Paper presented at Innovation Africa Symposium November 21-23, 2006 held in Kampala, Uganda.
- Devendra, C. 1980. The potential of sheep and goats in the less developed countries. *J. Anim. Sci.*, 51: 461-473.
- DinksewTaye and GirmaAbebe. 2000. *Socioeconomic aspect and husbandry practices of sheep in Awassa*. In: The opportunities and challenges of enhancing goat production in East Africa. Proceeding of a conference. Markel, R.C., Abebe, G. and Goetsch, A.L. (eds.) 113-117. Langston Univ., OK (USA). E (Kika) da la Garza Inst. for Goat Research; Debub Univ. Awassa (Ethiopia). College of Agriculture, 10-12 Nov. 2000, Awassa, Ethiopia.
- EARO (Ethiopian Agricultural Research Organization), 2000. National Small Ruminants Research Strategy Document. EARO, Addis Ababa, Ethiopia.
- Ehui, S., Benin, S., Williams, T., Meijer, S., 2002. Food Security in Sub-Saharan Africa to 2020, Socio-economic and Policy Research Working Paper 49. International Livestock Research Institute, Nairobi.
- FAO, 2011. FAOSTAT statistical database. <http://faostat.fao.org/site/573/default.aspx#ancor>. Accessed 17 January 2021.
- Food and Agricultural Organization (FAO, 2012). Crop and Food Security Assessment Mission to Ethiopia. Special report. Food and Agriculture Organization of the United Nations, Rome, Italy.
- Hiwot Desta Wodajo, Biruk Alemu, Wole Kinatib, Annet Abenakyo, Anouka van Eerdewijk, Barbara Wieland, 2020. Contribution of small ruminants to food security for Ethiopian smallholder farmers. International Livestock Research Institute (ILRI), Addis Ababa, Ethiopia
- Huss, D. 1982. Small animals for small farms in Latin America. *Wrld. Anim. Rev. (F.A.O.)*, 43: 24.
- Ibrahim H. 1998. *Small Ruminant Production Techniques*. ILRI Manual 3. ILRI (International Livestock Research Institute), Nairobi, Kenya. 207 pp.
- ILCA (International Livestock Center for Africa). 1993. ILCA's Long term strategy, 1993-2010. ILCA, Addis Ababa, Ethiopia, pp.102.
- Institute of Biodiversity Conservation, IBC, 2004. The state of Ethiopia's farm animal genetic resources: Country Report. A contribution to the first report on the state of the world's animal genetic resources, IBC. May 2004. Addis Ababa, Ethiopia.
- John, K.M.K., Demi, S., PK, A.D., 2013. Analysis of food security status of farming households in the forest belt of the Central Region of Ghana. *Russ. J. Agric. Socio-Econ. Sci.* 13.
- Knipscheer, H.C., de Boer, J., Sabrani, M. and Soedjana, T., 1983. The economic role of sheep and goats in Indonesia: A case study in West Java. *Bull. Indonesian Economic Studies*, 29 : 74-93.
- Maxwell, S. 1990. Food security in Developing Countries: Issues and Options for the 1990s, *IDS Bulletin* 21 (3): 2-13.
- Rege, J.E.O. 1993. Indigenous African small ruminants: a case for characterization and improvement. In: Lebbie S H B. Rey B and Irungu E K. (Eds). *Small Ruminant Research and Development in Africa*. Proceedings of the Second Biennial Conference of the African Small Ruminant Research Network, AICC, Arusha, Tanzania, 7-11 December 1992. ILCA (International Livestock Centre

- for Africa)/CTA (Technical Centre for Agricultural and Rural Co-operation).ILCA, Addis Ababa, Ethiopia.268 pp.
- Solomon Gizaw, AzageTegegne, BerhanuGebremedhin and Dirk Hoekstra. 2010. Sheep and goat production and marketing systems in Ethiopia:Characteristics and strategies for improvement. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 23. ILRI (International Livestock Research Institute), Nairobi, Kenya. 58 pp.
- TekelyeBekele, TadesseWoldeab, Lahlou-Kassi and Sherington, J. 1992.Factors affecting morbidity and mortality on-farm and on-station in the Ethiopian highland sheep.ActaTropica, 52(1992)99-109.
- Tembely, S. 1998. Small Ruminant Production in Ethiopia: Prospects for Improving Productivity. Proceeding of 5th Conference of ESAP.p.82-90.
- Tilahun F., 1994. Transforming the Ethiopian Pastoral Economy: A preliminary Assessment of Urban-Rural Linkages in Predominantly Pastoral Economies. A paper prepared for the Fourth Annual Conference on the Ethiopian Economy, Organized by the Department of Economics and Ethiopian economic Association, Debre-Zeit, Ethiopia, 26-29 November, 1994.
- Workneh Ayalew, 2006. Getting the Incentives Right: Concerns Associated with Expansion of Cattle Export Markets in Ethiopia. Eth. J. Anim. Prod. 6(2) - 2006: 99-103.
- World Bank, 2008.World Development Report 2008: Agriculture for development. Washington, DC.
- World Bank, 1983. Sheep and Goats in Developing Countries Washington. D.C., U.S.A.
- Zelalem Alemayehu and Fletcher, I. 1993. Small ruminant productivity in the central Ethiopian mixed farming systems. In: Proceedings of the fourth National Livestock Improvement Conference, 13-15 Nov. 1991. Addis Ababa, Ethiopia. IAR, Addis Ababa, Ethiopia.