



## **LIVESTOCK PRODUCTION: LIVELIHOOD AND EXTENDED BENEFITS ACCRUED TO DEVELOPING AND RURAL ECONOMIES, CONCERNS AND RECOMMENDATIONS**

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### **ABSTRACT**

Human beings being different from other living beings existing in the world need a sustainable source of livelihood for survival and for the enhancement of their welfare and wellbeing of the planet earth. Livestock is one of the important sectors for promoting sustainable livelihood. Based on the information available in published research articles, this paper summarizes the role of livestock in promoting livelihood and providing other extended benefits in developing countries and rural contexts. However, there is much scope and necessity for further improvement and besides, there are many concerns that need to be addressed and overcome. Some of the concerns raised and the recommendations concerning the livestock sector have also been presented in this paper. Livestock has been playing a pivotal role in fulfilling the various needs of human beings, particularly the livelihood requirement of a vast majority of the human population in the developing world and rural contexts.

### **Keywords:**

Livestock, Livelihood, Developing Countries, Rural Contexts, Sustainability.

### **I. Introduction**

Increasing the well-being and quality of life of all citizens with the help of rapid economic growth together with social justice leads to the economic development of a country [1]. The means of livelihood is an essential component in determining and uplifting the well-being of human beings. There are many means of livelihood available for people to earn and sustain themselves. Choosing a livelihood depends on various factors that encompass human life. Urbanisation phenomenon focuses on certain types of job availability depending on the educational levels of the population, availability of land, technical skills of the inhabitants and various other related factors. Similarly, the rural population also pursues certain types of livelihoods that are compatible with the rural demographic aspects. It is noteworthy to mention that sustainable livelihoods are given much importance these days. Sustainable livelihoods bring less harmful impact on the environment. A sustainable source of income helps preserve the environment, maintain the food cycle, and maintain the ecological balance among other benefits. Developing countries are striving hard to bring equitable growth and well-being to their citizens. Historically, economic growth and food security were positively influenced by the global livestock sector and global livestock production has quadrupled since the 1960s due to scientific advancement [2]. Livestock production is on the rise on account of income growth which is complemented by the change in dietary preferences and the growth in the human population [3]. Livestock value chains characterize the large number of growing employment sectors that include farm-level production, service and input opportunities to the farmers, livestock and associated products transportation, processing and marketing [4]. Job opportunities throughout the year are made available



to people who are engaged in animal production and all the family members including women, children and elderly persons can spend their spare time productively [5]. Livestock like small flocks of poultry birds can be kept near the homestead and also needs few labour inputs so that women can attend to it besides managing other time-consuming activities like cooking, child care etc. [6]. Domestic animals are vital for the survival of people living in variable environments and have been central to the development of societies and cultures [7]. The livestock development sector can aid in economic growth and reduction of poverty [6]. Livestock can also provide access to financial services in formal and informal markets [6]. Livestock production can contribute significantly to the livelihood of poor people and also has a tremendous scope for expansion to alleviate poverty [8]. Sales of animals, sales of animal-based products, services rendered using animal power, animal source food value chains generated employments generate cash incomes and livestock also provides food security by generating income that can be used to procure staple food [4]. A positive relationship exists between the national per capita income and the consumption of livestock products and it has also been observed that consumption increases when the livestock products become cheaper [9]. Sale of animals, sale and/or consumption of milk, meat, eggs and other animal products provide cash income or income in kind and livestock are a form of savings that serves as capital growth through herd growth and as insurance since the sale of animals provides immediate cash to deal with significant of unexpected expenditures [6].

Crop residues and by-products, grasses, fodder trees on marginal lands, community grazing areas, and wastes from households are sources of animal feed that can be used in raising animals on rural farms [5]. Crop by-products like rice bran or broken rice that are easily obtained in rural farms households can be used for feeding pigs or poultry [5]. Animals convert the feed resources like crop residues and by-products, forages, weeds, fodder trees (growing on marginal lands, highway roadsides, or lands not suitable for cropping and communal grazing areas) and kitchen refuse and left-over foods into useful animal products like meat, milk, eggs and services [5].

Livestock is one of the means of promoting sustainable livelihood. Agriculture-based developing countries can look to further augment the scope of increased incomes through the enhancement of livestock rearing. The paper aims to summarize the benefits of livestock as a source of boosting the livelihood of the people. Other extended benefits associated with livestock rearing are also noted besides highlighting some concerns raised and recommendations suggested.

## **II. Livestock as a source of livelihood and other extended benefits**

Agricultural growth which includes livestock is considered the most important development programme by policymakers and researchers [3]. It is reported that in the context of developing countries, agriculture is the lifeline and also the contribution of livestock in the agriculture sector in developing countries is about thirty percent while the involvement of livestock in agriculture is about forty percent globally [10]. The most talked about means of poverty reduction in rural areas is to undertake sustainable intensification of the agricultural sector and otherwise adopt the approach of livelihood diversification [11]. One of the ways of increasing the resource endowment of the poor is through income diversification, and diversification of income is vital for dealing with poverty as it enables the poor to spread the risks and thereby enhance their resilience against shocks [12]. Developing countries are using livestock as an intervention domain along with other strategies for income generating and poverty reduction measures among poor farmers [3]. The key components of the livelihoods of the poor are agriculture and livestock and livestock contribute substantially to household livelihoods and sustain the livelihoods of about 700 million rural poor people in developing countries [13]. Livestock contributes as much as 40% of the agricultural GDP in some developing countries [4]. Livestock has witnessed an annual growth rate of 3.77% when compared to 2.71% in crops and 1.18% in non-food commodities during the ten years before the year 2011 [3]. It was estimated that about 678 million of the rural poor keep livestock in developing countries [5]. The



developing world produces 41% of the milk, 72% of the lamb, 50% of the beef, 59% of the pork and 53% of the poultry globally and it is estimated that the contribution of the developing world is likely to increase significantly by the year 2050 as rates of growth of livestock production in the developing world are likely to exceed those in developed countries [14]. Expanding the capacity for livestock production and marketing can be a poverty alleviation measure in the context of developing countries [8]. Goats form an important species of livestock in the context of developing countries and the various factors like meat, milk, and hide production coupled with easier maintenance bestow pre-eminence to goats [1]. Rural households mostly own livestock which is one of the largest non-land rural asset portfolios and livestock also forms a major productive asset having a high rate of returns through progenies, use in the farming system and also through their sale or consumption of products [15]. From various sources, it has been revealed that livestock plays a very important role in providing livelihood, and food security and acts as a major source of income for the poor people in developing countries [16]. It was estimated that the demand for livestock products in developing countries would double in the next forty years [14]. Food security, food nutrition, income generation alleviation/decrease of poverty by providing food safety and improving the livelihoods of smallholder households can be achieved with the help of livestock and therefore livestock can help in achieving sustainable agriculture, particularly in developing countries [10]. Livestock helps poor people in many ways by enabling savings, providing security, allowing resource-poor households to accumulate assets, helping with planned and unplanned (for example, illness) expenses, providing products like milk, eggs, and manure, improving the nutrition of the household, helping to maintain social capital and status within people groups besides providing draught power [17].

The livestock ownership sequence (not empirically tested using nationally representative datasets) that is often referred to as the 'livestock ladder' refers to the poorest people keeping poultry, the slightly less poor keeping small ruminants and/or pigs and the more prosperous (in relative terms) keeping large ruminants like cattle and buffaloes [6]. Livestock productivity will be beneficial to many poor rural households and an increase in the returns from livestock can help some households to pursue more remunerative activities [6]. Livestock helps in improving the income and well-being of the farm family and thus plays a very important role in cultural, economic and social aspects of rural households [18]. Many studies have also confirmed the capability of the livestock industry as an important contributor to the lives of the rural poor and livestock is one of the most important sectors of agricultural economies [18]. Livestock provides agricultural products that are characterized by high income elasticity and also livestock provides rural households to participate in urban-based economic growth developments [8]. The global challenge to meet the greatly increased food production in impoverished rural areas incorporating the socioeconomically sustainable and carbon-efficient requirements can be met by small ruminant production [19]. Farm animals generate a significant number of jobs and small business opportunities besides providing cash-generating opportunities for livestock keepers in rural areas where other income-generating opportunities are scarce [4]. Earning income for sending the children to school is one of the motivations for livestock rearing among many poor livestock keepers [4].

From published literature it has been reported that rural households tend to have livestock across different income levels and it has been seen that in India the landless, marginal and poor poultry farmers have an average of seven to eight ordinary low-yielding chickens that help in getting eggs for household consumption and also to meet one-off expenses; while broilers of over twenty thousand in number are kept by wealthier farmers for earning profit [6]. In a study to assess the possibility of small ruminant farming in poverty alleviation in rural southern India further, it was revealed that sheep farming has the potential to alleviate poverty and also be resilient to short-term challenges like severe flooding [19]. The major source of income for smallholder and landless farmers is the dairy sector and it was reported in the year 2014 that milk and other dairy products contribute about two-thirds of the value of the Indian livestock sector and support the livelihoods of nearly half of India's 147 million



rural households [14]. In the year 2012, India produced 132 million tonnes of milk wherein half (51%) of the milk produced was from buffalo, with 24 and 21% of milk production from crossbred and indigenous cattle, respectively and about 4% of milk was sourced from goats [14]. In India, small ruminants help to improve the livelihoods of marginal and landless farmers in the drier areas of the arid and rain-fed zones [14].

More than 60 % of the people are dependent on agriculture and about 25% people are directly and 50% are partly engaged in the livestock sector whereas the contribution of livestock to GDP is around 3 percent with its share to agriculture GDP being more than 17 percent witnessing a GDP growth is more than 7 percent in Bangladesh [3]. Bangladesh is said to be an agro-based developing South Asian country where goats are an important livestock species because of their good market value, ease of marketing of goats and their products, high prolificacy rates and also because of their short generation intervals [1]. Expansion of goat rearing may lead to the removal of the problems of low income and protein deficiency of the rural people and it was also observed that farmers with more goats can earn relatively more profit in Bangladesh [1]. A large amount of female labour was engaged in goat farming activities and also goat farming was able to contribute 20.56 percent to the gross annual income thereby increasing the overall spending capacity by 21.09 percent due to goat farming [1]. Livestock can help to lift very poor households out of poverty in Bangladesh [20]. Livestock contributes significantly to the agricultural income of both the home production consumed within the households and the agricultural cash income of Nepal [13]. Rearing of livestock and its production are considered to be a profitable economic activity that is witnessing sustainable growth and providing livelihood to the rural population in the Gilgit Baltistan area of Pakistan besides contributing to income generation, reduction of rural poverty and also delivering a variety of food and food products [10]. After careful analysis, it was observed that livestock is essential for the rural economy because of its significant role in the eradication of poverty and also in supporting the livelihood of deprived people in the Gilgit Baltistan area of Pakistan [10]. In an empirical analysis poverty alleviation with the help of the development of livestock in Pakistan stated that the promotion of income sources and alleviation of poverty can be achieved [21].

More than one billion poor people in Asia and Africa accounting for one-seventh of the world population livelihoods are related to livestock production and marketing [4]. From the literature it has been reported that 70 million people in West Africa are supported by beef production and marketing, 124 million people in South Asia and 24 million in East Africa are supported by the dairy sector, small ruminants support 81 million people in West Africa besides supporting an additional 28 million in southern Africa, and it has also been estimated that more than 80% of poor Africans and up to 66% of poor people in India and Bangladesh keep livestock and the contribution of livestock to household income in developing countries ranges widely between 2% to more than 33% [4]. Highly selected birds are managed in relatively intense conditions for producing eggs or meat under smallholder poultry production comprising livestock enterprises that have become a feature of urbanisation in many countries and are termed peri-urban agricultural systems in Ghana [20]. To reduce poverty, minimise malnutrition in children, and promotion of resilience among rural poor families the Girinka (one cow per poor family) programme was implemented in the country of Rwanda in the year 2006 [22]. The one cow per poor family scheme resulted in expanded land use and also improved the nutrition and food security of the household [22]. The study also reported the confirmation of the women's awareness of the One Cow per Poor Family programme and its benefits in relieving hunger and poverty and in building resilience to drought conditions and climate change aided by sustainable farming practices [22]. The One Cow per Poor Family programme provided a source of manure that aided the agroforestry and sustainable farming practises thereby reducing the effects of climate change and the programme also improved the livelihood of the women beneficiaries [22]. It has been observed that the traditional livestock systems that are established on local resources and animal breeds contribute to a major source of livelihood for rural families and also is a means of providing food and income to



the poor people who are living in the oil-producing communities in the Niger Delta of the continent of Africa [15]. Among the rural women in the Niger Delta of the continent of Africa, the possession of livestock has emerged as an alternative form of wealth [15]. In Mexico rural households that are very poor rear piglets to maturity for selling them to meet immediate cash needs like the purchase of cereals and poor pastoral people rear cattle that are adapted to severe climatic conditions to obtain milk for household consumption [6].

Animals in rural farms perform a more complex role than those in commercial farms as the animals in rural farms have close and varied relationships between farm families, animals, crops, and social and agricultural systems and they contribute to achieving household benefits, increased productivity of integrated farming systems, sustainability of agricultural systems, environment sustainability besides enhancing rural and social stability [5]. Livestock are productive assets that directly help through animal traction and indirectly as a store of wealth for future investment [8]. Livestock also gives impetus for various other activities like the production and transportation of feed materials, creation of allied services like veterinarians, dietary specialists and other associated jobs like milk processors, butchers, retailers, wholesalers etc., and also realizing various products like dairy products, meat, eggs, wool, leather, bone products, pharmaceuticals, fats and industrial proteins that are acquired from animals [10]. Animal wastes like intestines are further used as fertilizers for crops and the dung/manure of animals helps to keep the land fertility and is also used as a fuel [10]. Through manure and draft power, the livestock can impart benefits to cropping [23]. In regions characterized by a lack of machine power cattle can be used for transportation as well as for farm-related mechanical uses like tillage etc. [10]. Animals form an important place in the small farm systems when considering the economic and ecological factors and small farmers own animals due to various advantageous reasons like expansion regarding the use of production resources and reduction of socioeconomic risks, promotion of linkages between system components (land, crops and water), generation of value-added products (example meat, milk, eggs and skins), income generation, investment, insurance and economic security, supply of draught power for crop cultivation, transportation and haulage operations, contributions to soil fertility through nutrient cycling (dung and urine), contribution to sustainable agriculture and environmental protection, prestige, social and recreational values besides development of stable farm households [5]. The contribution of animals to human cultural needs involves the use of animals in exhibitions/shows, religion/ceremonies, fighting, racing, pets/recreation, and as status symbols etc. [5]. Livestock can contribute to soil fertility and agricultural waste recycling [8]. Many services and other by-products that the livestock provide to households such as finance, insurance, social status, draught power, hauling services and dung (that can be used as manure, fuel, feed and construction material) are not measured from the data about the contribution of livestock to the income of rural livestock-keeping households [6]. Labour productivity can be improved through the livestock sector development [21]. Livestock also make available manure, draught power and services for transport that can be used on the household farm or livestock can be exchanged on the market for rental purposes (renting bull for ploughing) besides livestock can also be a source of wealth and can also contribute to social status [6]. The possession of livestock is a source of animal protein and also enhances purchasing power due to the sales of milk, meat, eggs, and manure [2]. The possession of livestock offers a mobile, inflation-resistant store of wealth, draft power, and fertiliser, and also provides fuel that is obtained from manure burning [2]. Keeping livestock helps households escape from poverty and also prevents them from declining into poverty [2]. It has also been observed livestock has acted as a pathway out of poverty that has underpinned the development praxis since the 1980s because of its benefits to livelihoods [2].

Livestock are a source of extra income and nutrition and have an enormous potential for reducing poverty [3]. The livestock sector is very important and one of the major sources of income for low-income economies, and poor households in rural areas besides guaranteeing food security and also offers scope for exchange of livestock of livestock products for grain [21]. Low-value materials that



are inedible or unpalatable for people are converted into milk, meat and eggs by the livestock thereby contributing to the food supply [4]. Nutrition-based dense sources of energy, protein and other essential micronutrients are found in animal-based food sources while starch foods-based diets do not meet all the nutritional needs [4]. Vitamin B<sub>12</sub> and other micronutrients together with iron, zinc, vitamin A, and calcium are available naturally in animal-based foods [4]. Animal-source foods help in normal physical and cognitive development by providing essential nutrients [4]. The poor people benefit by keeping livestock as they provide the nutritional requirements and also deliver income [4]. Livestock helps to produce marketable products like meat, eggs, and milk from scalable household and community production systems and they are less vulnerable to critical harvest timing when compared to many crops [8]. It has been reported from various sources that the livestock contributes to family support, food security, income, land productivity, livelihoods, agricultural sustainability, transport, cultural and social objectives and finally family and community employment and also plays a significant role in providing livelihood opportunities to rural communities through the provision of food, uncooked nutritious elements, and income and also contributes to rural development [18]. Various sources have revealed that animal food products provide livelihoods for millions of people also provide essential protein and micronutrients for poor people globally and play a vital role in reducing stunting and wasting [7]. The goals concerning food security, alleviation of poverty and human well-being in different environmental and climatic settings as proposed in the United Nations Sustainable Development Goals can be achieved through small ruminants [24]. Sheep and goats supply meat, milk and wool, which are valuable for trading purposes and also contribute directly to the food security of the households [14]. In 2012-2013, mutton and chevron production accounted for almost 7% of the value of the livestock sector, wool and hair accounting for only 0.1%, while the small ruminant population was dominated by goats accounting for 68% of the population with indigenous sheep comprising of 31% of the small ruminant population, and the improved, exotic sheep breeds contribution was about 2% only [14]. The large ruminants (buffalo and cattle) are necessary for agriculture, farm security, production of milk, meat production, ploughing, and dung production, whereas small animals (goats, sheep, chickens, pigs and ducks) are necessary for nutritional security and household security [5].

The agricultural sector is characterized by notable sub-sectors like major crops, minor crops, livestock and forestry [21]. Small farming systems in the context of Asian agriculture are characterized by mixed farming systems wherein crops and animals are integrated on the same farm [5]. Mixed crop-livestock systems produce 50 % of the cereals worldwide and much of the direct production of the global red meat and milk production and livestock also contributes to the staple food production by making available manure, contributing to land preparation, and providing ready cash to buy planting materials or fertilizer or to hire labour for planting, weeding, or harvesting and livestock can thus increase the area of land cultivated, yields and productivity, the feed produced from crop residues, and also through enhanced nutrient recycling livestock enhances the sustainability of those farming systems [4]. When harvests fail or in times of natural calamities livestock can provide the necessary buffer thereby smoothing out the availability of food [4]. Livestock has both direct and indirect contributions to make in the food and nutrition of the household and also acts as a cushion against fluctuations in crop yield and ensures the availability of food by sustaining the food supply [21]. The main source of income for the farmers is from the crops whereas extraction of forest produce and cattle keeping are other means to diversify the income [12]. Rural farmers in developing countries rely on mixed crop-animal farming whereby the combination of crops, animals, and fish generate more output from the crop-animal interactions through interdependent elements, particularly through enhanced use of crops and animal wastes and by-products [5]. Livestock compliments other sources of income and also enables provision for income during critical times of the year [6]. The total farm productivity or the combined production per unit area will be greater than the monoculture production system if the animals are integrated into the mixed crop-animal farming systems [5].



The relationship between various types of animals like poultry (chickens, ducks, turkeys, geese, quails), small ruminants (goats, sheep, deer, rabbits) and pigs, and large ruminants (cattle, buffalo, camels, yak, banteng) concerning their inputs (feeds, labour) requirements and outputs (economic, security, socio-cultural) have been tabulated by Devendra and Chantalakhana, (2002) [5].

### III. Livestock farming: Concerns

Livestock production for commercial purposes across the globe requires large amounts of agricultural land, and consumption of large amounts of water resources and also contributes to water and soil pollution [2]. Several opportunities are available for the poor to join in by providing inputs and also supplying services in different ways in livestock product processing and marketing as the market chains of the livestock are long and complex [17]. There is a lack of sufficient understanding of livestock livelihood linkages [6]. Very poor people mostly lack the resources to invest in small animals [6]. The process of quantification of the contribution of livestock to household income is difficult to ascertain as information related to the quantity and value of products such as milk, meat, eggs and dung (used as fertiliser, fuel or building material) consumed and/or marketed, the quantity and value of services provided, such as bullock ploughing and transport, the amount and cost of inputs (feed, water, family and hired labour, veterinary services, stock replacement etc.) used etc., changes in value of the livestock inventory over the reference period that is attributed to the changes in herd size on account of births, deaths, purchases, sales, and gifts as well as from appreciation/depreciation of individual animals due to factors like weight gain due to fattening [6]. The livestock enterprise is characterised by risk and uncertainty [1]. Lack of grazing land, lack of improved goat breeds, lack of housing facilities, lack of credit availability, inadequate veterinary services, lack of extension services and theft of goats are some of the major problems reported by farmers of Bangladesh concerning goat farming [1].

It is interesting to note that livestock supplies thirteen percent of energy to the world's diet but at the same time consumes one-half the world's production of grains to do so [4]. Livestock decreases the food supply by competing with human beings for food especially concerning the grains supplied to the pigs and poultry [4]. Various sources reveal that the constructive interactions between the livestock sector and sustainable development are often overlooked in different studies related to the environmental impacts of excessive consumption of animal-source food [7].

From various literature, it has been noted that the livestock sector is estimated to be accountable for about 13% of global greenhouse gas emissions besides occupying 26% of total ice-free land surface area of our planet (22% through pastures and rangelands and 4% of cropland used for feed), and further livestock consumes 36% of calories produced by crop plants and account for 15% of total groundwater use and 12% of water pollution [7]. Ruminants excrete a range of greenhouse gases thereby contributing to climate warming, and an increase in livestock production leads to changes in land use thereby increasing greenhouse gas emissions [2]. Production of livestock can negatively impact food security through the production of greenhouse gases that aid in promoting climate change in the long run [4]. Livestock production is also said to cause pollution due to fossil fuel, waste discharge, and land and water consumption besides being a major stressing factor on ecosystems in addition to being the cause of generation of greenhouse gases and causing destruction to the biodiversity [10].

Amassing of livestock assets is threatened because of diseases in the animals and animal diseases decrease the productivity of the livestock diseases transmitted from animals to human beings put in danger the health of the people dependent on livestock and also affect the productivity of the livestock-dependent people [17]. Most foodborne diseases are traced to animal source foods and around two-thirds of all diseases and three-quarters of all emerging diseases are transmitted from animals to people commonly termed zoonotic diseases [17]. Food security is impacted by livestock because of transmission of diseases to the people through flies and contaminated animal source foods and such



diseases limit the productivity of people by reducing their ability to produce food for themselves and also reduce the people's ability to work and earn income to purchase food [4].

It was estimated that there is one goat, sheep or cow and six chickens for every two people living on the planet Earth and a significant amount of antimicrobial drug use each year on the population of food animals has been observed giving rise to major concerns concerning the environmental waste, and also its impact on the trends witnessed in the increasing multistrain antibiotic resistance in animal and human beings is a cause of concern [7]. The risk of antimicrobial drug resistance in humans that can be ascribed to the use in livestock is an important research problem [7].

#### **IV. Livestock production: Recommendations**

Societies benefit a lot by incorporating the changes that are recommended based on life experiences. The recommendations proposed by various researchers are given in the following sentences. Recommendations have been given that are applicable taking into considerations the local prevalent conditions. The creation of circular livestock supply chains by reducing the competition for land among the cropland and livestock to reduce material waste and pollution is recommended [7]. Vulnerable people groups should be protected through the increase in productivity and incomes of the poor with the help of livestock systems and by taking care of the sovereignty of nomadic and indigenous peoples and lands with the incorporation of the right to food in the legal and political structures of countries besides ensuring safety nets in place to protect the people who are at risk from climate change and price shocks [7]. The total system productivity can be increased by way of the interactions between improved nutrition improved reproduction and reduced mortality and at the same time protecting the livestock assets [14].

In a study to find out the poverty alleviation in the rain-fed areas of Jammu and Kashmir with the help of livestock farming it was recommended that in hilly areas encouragement should be given to cross-bred species of livestock species, training and supervision at the farm level should be given to livestock record keeping, regular focus on poverty statistics should be performed by the local Government bodies, rescheduling of the response time and strategy by the local assistance providing departments, pro-poverty policies and reforms to help the development practitioners for institutional reforms to support vulnerable livestock farmers, making available the veterinary services at the doorsteps of the farmers, opening of the local mandis and markets near rural areas for the sale of livestock products, concentrating on specific specie-mix rather than increasing the population of undescriptive animals, promoting the increase in the population of high producing animals through cross breeding, decreasing the total population by reducing the population of low yielding animals, development of livestock informatics in the public domain, conservation of indigenous livestock in its niche areas by providing incentives for production losses, development of elite male mother farms to meet the germplasm requirements as per the breeding policy for given species, promotion of open nucleus breeding system for alleviating productivity losses and genetic degradation in the farmer's flocks, promoting low-input low out-put rearing system in the resource deficient regions, ensuring a vigorous disease monitoring and surveillance system involving clinical level disease reporting for animal health management, providing incentives for culling the animals that is undertaken for eradication of economically important diseases like para tuberculosis, brucellosis, etc., encouragement of integrated farming system to facilitate optimal utilization of land resources, encouraging livestock rearing on scientific principles, and ensuring technology transfer for value addition, and safe and secure marketing of produce for linking livestock production with markets [18]. From a study in Bangladesh, it was suggested that veterinary training and services are necessary for the success of livestock enterprises in poor households [9]. Livestock farming has the potential to increase household income and it was recommended to conduct training and involvement and contribution of women in the livestock sector should be encouraged for reducing poverty and for achieving sustainable economic growth in the Gilgit Baltistan area of Pakistan [10]. In a study to find the contribution of cattle to livelihoods and





relationships between cattle and potential wildlife land uses in rural areas near Kruger National Park in South Africa, it was concluded that cattle production has a vital role in livelihood but is not sufficient as a medium for economic development in the study area and it is recommended that diversification of livelihoods at the wildlife/livestock interface for finding out the wildlife-based land uses should be attempted [23]. It is recommended that the policies should be framed to suit farming systems, species, livestock usages and different wealth groups [6]. In a study related to poverty dynamics and the role of livestock in the Peruvian Andes, it was suggested that improvements be made in accessing appropriate livestock technologies, access to insurance for livestock losses etc., for protecting the households from falling into poverty [25].

The benefits, recommendations and concerns about livestock rearing are summarized in the following Table 1.

Table 1. Livestock: Benefits, recommendations and concerns

Benefits	Recommendations	Concerns
<ul style="list-style-type: none"> <li>• access to financial services</li> <li>• accumulation of assets</li> <li>• agricultural waste recycling</li> <li>• alternative form of wealth</li> <li>• animal traction</li> <li>• consumption of products</li> <li>• contribution to the food supply</li> <li>• creation of allied jobs and services</li> <li>• development of cultures</li> <li>• development of societies</li> <li>• development of stable farm households</li> <li>• dung production</li> <li>• economic growth</li> <li>• employment generation</li> <li>• enhances the purchasing power</li> <li>• enhancing labour productivity</li> <li>• enhancing rural and social stability</li> <li>• environment sustainability</li> <li>• food security</li> <li>• food security</li> <li>• generating fuel</li> <li>• human cultural needs</li> <li>• improvement in human wellbeing</li> <li>• improvement of land fertility</li> <li>• in formal and informal markets</li> <li>• income generation</li> <li>• increased productivity of integrated farming systems</li> <li>• job opportunities</li> <li>• livelihood diversification</li> </ul>	<ul style="list-style-type: none"> <li>• access to insurance for livestock losses</li> <li>• accessing appropriate livestock technologies</li> <li>• conservation of Indigenous livestock</li> <li>• Creation of circular livestock supply chains</li> <li>• cross-bred species of livestock species</li> <li>• development of elite male mother farms to meet the germplasm requirements</li> <li>• development of livestock informatics in the public domain</li> <li>• diversification of livelihoods</li> <li>• encouragement of an integrated farming system</li> <li>• encouraging livestock rearing on scientific principles</li> <li>• ensuring technology transfer for value addition</li> <li>• Increasing total system productivity</li> <li>• linking livestock production with markets</li> <li>• opening of the local markets near rural areas</li> <li>• promotion of open nucleus breeding system</li> <li>• pro-poverty policies and reforms</li> </ul>	<ul style="list-style-type: none"> <li>• antimicrobial drug resistance in humans</li> <li>• cause pollution due to fossil fuel and waste discharge</li> <li>• changes in the land-use</li> <li>• consumption of large amounts of water resources</li> <li>• contribution to climate warming</li> <li>• contribution to water and soil pollution</li> <li>• decrease in the productivity of the livestock due to diseases</li> <li>• decrease the food supply</li> <li>• difficulty in the quantification of the contribution of livestock</li> <li>• diseases in the animals</li> <li>• diseases transmitted from animals to human beings</li> <li>• food borne diseases</li> <li>• food security</li> <li>• greenhouse gas emissions</li> <li>• Increase in multistrain antibiotic resistance in animal</li> <li>• land and water consumption</li> <li>• major stressing factor on ecosystems</li> <li>• negative impact on food security</li> </ul>



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| <ul style="list-style-type: none"><li>• meat production</li><li>• minimizing malnutrition</li><li>• nutrient recycling in the soil</li><li>• ploughing</li><li>• poverty reduction</li><li>• production of milk</li><li>• promotes mixed crop-animal farming systems</li><li>• sale of products</li><li>• small business opportunities</li><li>• social and recreational values</li><li>• source of animal protein</li><li>• source of extra income</li><li>• source of extra nutrition</li><li>• source of manure</li><li>• source of micronutrients</li><li>• store of wealth for future investment</li><li>• sustainability of agricultural systems</li><li>• sustainable economic growth</li><li>• sustainable livelihood</li><li>• sustaining the food supply</li><li>• transportation and haulage operations</li><li>• utilization of crop residues</li></ul> | <ul style="list-style-type: none"><li>• Protection of vulnerable people groups</li><li>• providing incentives for production losses</li><li>• regular focus on poverty statistics</li><li>• training and supervision at the farm level</li><li>• veterinary training and services</li><li>• vigorous disease monitoring</li></ul> | <ul style="list-style-type: none"><li>• overlooking the sustainable development</li><li>• requires large amounts of agricultural land</li><li>• risk and uncertainty</li></ul> |
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## V. Conclusion

Livestock rearing has proved to be a source of sustainable livelihood and enhancement of human well-being. Ample evidence is available concerning the contribution of livestock to economically uplift the lives of the people, especially in developing countries. All efforts should be taken to implement the recommendations proposed. Researchers can continue making efforts to address the various concerns raised for continual improvement of the livestock sector.

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