UNVEILING THE NEXUS BETWEEN LIVESTOCK AND SUSTAINABLE DEVELOPMENT GOALS (SDGS) IN DISTRICT MUSAKHAIL, BALUCHISTAN

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ABSTRACT

This research analyzes the role of livestock in contributing to the achievement of Sustainable Development Goals (SDGs) in Musakhail, Baluchistan, Pakistan. One hundred (100) livestock farmers registered with the Livestock and Dairy Development Office in Musakhail were taken as respondents. The study subjects were randomly interviewed with a pre-designed, structured interview scheduled with closed and open-ended questions; additional information was also gathered from stakeholders, applying focus group discussions and observations. On the other hand, secondary data included books, journals, articles, and authentic websites. The primary data was analyzed by using descriptive statistics, logistic regression, correlation, and linear regression. The findings of this study revealed that the livestock sector plays an important role in the implementation of sustainable development goals. Livestock is a major source of household income for respondents. They increased their assets and social status with the help of savings from livestock farms. The study demonstrated that livestock significantly contributes to SDG 2, zero hunger, and SDG 3, good health. 70% of respondents said they were not facing any chronic diseases. An overwhelming majority (89%) of the respondents have access to high-quality health care. Results also indicated that the livestock sector contributed to increasing the education ratio and implementing Goal 4 for quality education in the district of Musakhail. To improve the livestock sector, we recommended the provision of basic facilities such as free medical care, availability of doctors, and well-equipped hospitals at the village level. They should also be provided with livestock farming and the skills required to produce products from wool and skin and support to access national and international markets by introducing meat and milk processing units. This sector can strongly contribute to income generation and create job opportunities.

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INTRODUCTION

The livestock sector not only contributes to income but also plays an important role in the implementation of the Sustainable Development Goal (Salmon, 2018). Livestock improves livelihoods, such as savings, security, the ability of poor families to accumulate assets, and financing of planned and unplanned expenses (Pell et al, 2010). Livestock can play an important role in eradicating malnutrition by providing safe nutritious fodder, helping to reduce poverty reduction, and providing basic education (Israr, 2022; FAO, 2018). In developing countries, an estimated 290,000,000 females depend on livestock for their livelihoods (FAO, 2011, 2013). Livestock helps households earn a living and improve people's livelihoods by providing them with access to food, maintaining good health, and working to accomplish certain tasks (Abed & Acosta, 2018). Livestock farming plays an important role in the lives of farmers in developing countries. It provides food, income, and job contributions to rural communities (Mehrabi et al., 2020). Asia is considered the largest in the world with water and a large number of farm animals and poultry (Keeling et al. 2019). Furthermore, on its economic impact, it is also observed that the livestock sector plays an important role in the economic development of developing countries (FAO, 1995).

The year of Sustainable Development 2030 was introduced in 2015 to eradicate poverty and put the world on the path to peace, prosperity, and opportunity for all. The seventeen Sustainable Development Goals (SDGs) require nothing less than reshaping the financial, economic, and political systems that govern our societies today to ensure the rights of all (UN, SDGs Report, 2020). Pakistan has been dedicated to the 2030 Agenda for Sustainable Development since its launch in 2015. In February 2016, it was the first country in the world to accept the Sustainable Development Goals (Government of Pakistan, 2019). Livestock plays an important role in Pakistan's agricultural sector which corresponds to approximately 56.3% of the additional agricultural value. Over 35 million people have participated in this sector, which accounts for around 11% of the GDP (Rehman et al., 2017). Furthermore, Baluchistan is the largest province in Pakistan, where the livelihood mainly depends on livestock in common and free/open areas. However, the province accounts for 44% of the total land area but only owns 5% of the arable land. The livestock sector in this province is very important as it represents about 20% of the national herd (FAO, 2002). The contribution of the livestock sector to Baluchistan's economy is much larger than that of other agricultural sectors.

Moreover, livestock pays more than 50% of the agricultural share of the provincial economy, which also holds about 52% of the provincial domestic product (Pakistan Economic Survey, 2007- 08).

In the current times of global recession, it is reported that one in eight people in the world lives in extreme poverty. There are around 815 million people in the world who are undernourished. Each year, six million children die before the age of five. Twenty million people are jobless and climate change is putting great pressure on the resources we depend on (FAO, 2018). A notable challenge to the change required in the implementation of the SDGs is the need to raise awareness among scientists and the research community.

Pakistan, a country with significant natural resources and a workforce, was also challenged on issues of sustainability (SDGs). There are many capacity-building challenges along the path to women's development in Pakistan. Government capacities are limited (both human and financial) and women's issues are vast and varied (Institute for Sustainable Development Policy, 2018). The lack of resources for the marketing of livestock is one of the major problems facing the livestock sector (Padda et al., 2018; Raziq et al., 2008). Drought affected about 40 percent (9.32 million) of the animals, with 20 percent dying and another 20 percent suffering loss of productivity and health. It also resulted in financial losses of PKR 3,522 million (FAO, 2006).

Training institutes for farmers are scarce in the province, and specialized institutions in particular lack information on animal production issues (Acosta & Luis, 2019). Technical staff are trained only in animal health services and there is no training in breeding, feeding, and management services or productivity improvement services (FAO, 1987). Radzil et al. (2023) posit that the lack of technical training related to cattle farming leads to a major loss in potential economic resources and gains.

The seemingly insignificant links between scientists, think tanks, and policymakers are very important in Pakistan and reject the implementation of the SDGs and require concerted and collaborative efforts from all sectors of society and government. It will help in decision-making and facilitate the exchange of information between the different units involved in the implementation of the SDGs (SDPI, 2019). The government should ensure that institutional capacity development is increased to facilitate the SDG framework at state and provincial levels, with an emphasis on ownership and commitment. In order to quickly reach the global agenda and meet the challenges of (SDGs) implementation in the country (Khan & Ali, 2019).

Globally, animal products contain about 30 percent protein in the human diet (Gill & Smith, 2008). To give women access to economic prospects, more educational and vocational training facilities must be established. Additionally, awareness-raising initiatives can influence the local population's perspective and motivate them to support women's economic engagement (Ali et al., 2023) Data collection, monitoring, accountability, and capacity building play a vital character in the implementation of the SDGs. Scientific findings are also important for policymakers to improve policy implementation and ensure the achievement of the 2030 Agenda (SDPI, 2019). The performance of sustainable Public-Private Partnership (PPP) projects is a major topic in the field of project management. PPP has assumed the top spot in the world of project management, but its consequences still require development (Tipu et al., 2023). The scientific results of this study hence will help participants understand the strengths and challenges of the Musakhail Baluchistan livestock sector. The study will benefit the Department of Livestock, NGOs, and communities dependent on livestock.

Study Area

Baluchistan is Pakistan's largest province geographically, covering around 44% of Pakistan. The people of Baluchistan largely depend on agriculture and animal husbandry as their main means of livelihood. The study was conducted in Musakhail District. Musakhail district is part of Loralai Division, which has a population of 167,017 (as of the 2017 census). Musakhail district has a land area of 5,728 square kilometers. The Musakhail district is on the northeastern border of Baluchistan and crosses the regions of Khyber Pakhtunkhwa and Dera Ghazi Khan, in Punjab. The Musakhail district is divided into four tehsils: Tehsil Durug, Tehsil Musakhail, Tehsil Kingri, and Tehsil Toisar.

LITERATURE REVIEW

Livestock and Sustainable Development Goals (SDGs) have garnered significant attention in the literature, as the livestock sector plays a crucial role in achieving various SDGs. The research conducted by Acosta et al. (2019), highlights the linkages between livestock and SDGs. Their findings suggest that the livestock sector has predominantly positive impacts on SDGs, although there are a few negative aspects as well.

The livestock sector contributes to SDGs in several ways. It plays a vital role in ensuring food security and nutrition by providing a significant source of animal protein. Livestock also contributes to economic growth and poverty reduction, particularly in rural areas where it serves as a source of income and employment (Schneider & Tarawali, 2021). Additionally, livestock farming can enhance gender equality, as women often play a fundamental role in

livestock rearing and management (Schneider & Tarawali, 2021). However, there are challenges associated with the livestock sector that need to be addressed to achieve sustainable development. Livestock production can have negative environmental impacts, such as deforestation, greenhouse gas emissions, and water pollution (Serra Prieto et al., 2019). These issues need to be mitigated through sustainable practices, including improved animal welfare, efficient resource use, and proper waste management.

Globally, efforts are being made to align livestock production with the SDGs. The Mediterranean region, for example, is implementing strategies to integrate SDGs into livestock and food systems. Capacity building initiatives focused on climate change and its impact on SDGs are also being explored (Simmons et al., 2023). Henceforth, the literature acknowledges the significant role of livestock in achieving SDGs but also emphasizes the need for sustainable practices to mitigate negative impacts. Further research and efforts are required to ensure that livestock production aligns with the principles of sustainable development and contributes positively to the SDGs.

METHODS AND ANALYSIS

Data Collection and Analysis

The research study was conducted in the study area in the district of Musakhail, Baluchistan, Pakistan. One hundred (100) livestock farmers registered with the Livestock and Dairy Development Office in Musakhail were taken as study subjects. The respondents were randomly interviewed with a pre-designed, structured interview scheduled with closed and open-ended questions. The respondents were interviewed after translating the questions into the local languages (Pashto, Jafferki, and Balochi); additional information was also gathered from stakeholders' focus group discussions. The data were analyzed by the Statistical Package for Social Sciences (SPSS) using descriptive statistics, logistic regression, correlation, and linear regression.

RESULTS

According to the findings of the study 79% of men and 21% of women were involved in livestock farming it was their major source of livelihood in District Musakhail, Baluchistan. Findings showed that the average age of the respondent was 49 years, the number of children of the respondents was an average of 8, the size of the household was an average of 10 family members, and an average of 2 family members were involved in livestock farming. The findings indicated that 82% of respondents were married, and 18% of them were widows.

Results revealed that 68% of respondents were illiterate, 19% had completed primary education, 7% had completed matriculation, 5% had intermediate, and 1% had completed their master's. Findings showed that 10% of respondents lived in the nuclear family system, 6% lived in the extended family system, and 84% lived in the joint family system. According to the findings, livestock was the primary source of income for 100% of the respondents. The study showed that 60% of respondents lived in paved homes, which were stone and brick TR Gadder rooms were built from savings from the same livestock farm, 30% in unpaved homes, and 10% in wooden-shaded homes. The results of the study revealed that 2% of respondents were farming only sheep, 3% were farming only goats, and 95% were farming both goats and sheep in the study area.

Table 1. Respondent's Profile

Description	Frequency	Percentage
Gender of respondents		
Male	79	79.0
Female	21	21.0
Total	100	100.0
Marital status		
Married	82	82.0
Widows	18	18.0
Total	100	100.0
Type of family		
Nuclear	10	10.0
Joint	84	84.0
Extended	6	6.0
Total	100	100.0
Qualification of respondents		
Illiterate	68	68.0
Primary	19	19
Matriculation	7	7.0
Intermediate	5	5.0
Master (16 years of education)	1	1.0
Total	100	100.0
A major source of household income		
Livestock	100	100.0
Total	100	100.0
Home structure of respondents		
Paved	60	60.0
UN-paved	30	30.0
Wooden shed	10	10.0
Total	100	100.0
Type of livestock farm		
Sheep	2	2.0
Goat	3	3.0
Both	95	95.0

| Total | 100 | 100.0 |

Source: Field Survey 2021

Positively Associated Variables with Sustainable Development Goals (SDGs)

Twenty-three (23) variables were found positively associated with poverty alleviation, good health, quality education, decent work, and economic growth namely, (X1) Type of family of respondent [.375**], (X2) engaged family members in livestock farming [.490**], (X3) number of total animals [.856**], (X4) number of sheep [.647**], (X5) Cash saving asset from livestock farm saving [.787**], (X6) Number of sheep asset from livestock farm saving [.650**], (X7) Number of goats asset from livestock farm saving [.628**], (X8) Number of vehicles asset from livestock farm saving [.514**], (X9) Number of enrolled children in school [.502**], (X10) Number of enrolled children in college [.461**], (X11) Number of enrolled children in university [.472**], (X12) Number of enrolled children in madrassa [.434**], (X13) Average rupees spend on children education [.719**], (X14) average household use of milk per day [.630**], (X15) Mostly where from you get health services .330**. (X16) Maternal mortality ratio in family overall [.405**], (X17) mortality rate in the family annually [.261**], (X18) Average of rupees spend on family's health annually [.638**], (X19) the number of women working in livestock farm [.690**], (X20) the number of male workers [.632**], (X21) the number of women workers [.389**], (X22) Does this livestock farm offer any job to disable workers [.498**], (X23) number of disable workers [.498**].

Table 2. Correlation between SDGs and Livestock

Variables	Pearson Correlation	Significance
Type of family of respondent	.375**	.000
Engaged family members in this livestock farm	.490**	.000
Number of total animals	.856**	.000
Number of sheep	.647**	.000
Cash saving assets from livestock farm saving	.787**	.000
Number of sheep assets from livestock farm saving	.650**	.000
Number of goat assets from livestock farm saving	.628**	.000
Number of vehicle assets from livestock farm saving	.514**	.000
Number of enrolled children in School	.502**	.000
Number of enrolled children in college	.461**	.000
Number of enrolled children in university	.472**	.000
Number of enrolled children in madrassa	.434**	.000
Average rupees spent on your children's education	.630**	.000
Average household use of milk per day.	.719**	.000
Mostly from where you get health services	.330**	.001
Maternal mortality ratio in your family overall	.405**	.000
Mortality rate in your family annually	.261**	.009
Average rupees spent on family health annually	.638**	.000
Total females work livestock farm	.690**	.000
Total male workers	.632**	.000
Total female workers	.389**	.000

Job opportunities for disabled workers	.498**	.000
Total disable workers	.498**	.000

Source: Field Survey, 2021

DISCUSSION

This research was carried out in Musakhail, Baluchistan, Pakistan, to learn about and emphasize the role of livestock in the implementation of the Sustainable Development Goals (SDGs). According to the study's findings, more than half of males and less than a quarter of females were involved in livestock farming in Baluchistan's Musakhail district. Findings showed that the average age of the respondent was 49 years, the number of children of the respondents was an average of 8, the size of the household was an average of 10 family members, and an average of 2 family members were involved in livestock farming. The findings indicated that more than half (82% of respondents) were married, and less than a quarter (18%) of them were widows. Findings revealed that more than half (68% of respondents) were illiterate, less than a quarter (19%) had completed primary education, 7% had completed matriculation, 5% had intermediate, and 1% had completed their master's. Findings showed that 10% of respondents lived in the nuclear family system, 6% lived in the extended family system, and more than half (84% lived in the joint family system). Results revealed livestock was the main source of income for all respondents. The study showed that more than half of respondents lived in paved homes, less than half (30%) lived in unpaved homes, and less than a quarter (10%) lived in wooden-shaded homes. The results of the study revealed that 2% of respondents were farming only sheep, 3% were farming only goats, and more than half (95%) were farming both goats and sheep in the study area.

"No Poverty" and Livestock

SDG 1 calls for a multidimensional approach to ending poverty. Given the livestock sector's expected rapid growth and the assumption that many of the poor rely on livestock for their livelihoods, livestock's positive contribution to poverty reduction has sometimes been taken for granted. Livestock can indeed play a catalytic role in strengthening the assets that rural households use to achieve their livelihood objectives, and in increasing the resilience of families to external shocks (FAO, 2018).

Results indicated that the livestock sector significantly contributed to improving Goal No: 1 (no poverty) of the Sustainable Development Goals (SDGs). Livestock is a major source of household income for respondents. With the help of savings from livestock farms, they increased their assets and their social status. They increased the average by 30 goats and 29 sheep, and every respondent saved an average of 415900 rupees; on average, every farm holder

has 1 vehicle for their convenience; at their maximum, they have 3 hectares of land from livestock farming; all respondents were satisfied, and they believed income from livestock farms is enough for household expenses. Results showed among respondents with extended families, the majority of whom were involved in livestock activities, the analysis discovered a positive correlation (.375**) between family type and poverty alleviation. According to the findings, families with more livestock contributed significantly to poverty reduction (.490**). Respondents with more than 100 animals were more committed to poverty reduction (.856**). Outcomes also indicated that those livestock farmers who were farming sheep certainly were contributing to reducing poverty. According to the findings of this research study, livestock contributes significantly to poverty reduction in the Musakhail district. Farmers increased assets from their farm savings, cash saving (.787**), the number of sheep increased from livestock farm savings (.650**), the number of goats increased from livestock farm savings (.628**), and the number of vehicles increased from livestock farm savings (.514**).

"Zero Hunger, Good Health" and Livestock

Goal 2 of SDGs seeks to end hunger and all forms of malnutrition. The livestock sector can contribute significantly at different levels and from different angles. At the household level, it can increase the direct consumption of ASFs and help generate income; at the rural community level, it can support the creation of employment opportunities; at the national economy level, it can reduce ASF prices. Livestock and zero hunger earn foreign exchange; and at the global level, it can provide the world with sufficient and reliable supplies of meat, milk, eggs, and dairy products (FAO, 2018).

The research study showed that the livestock sector positively contributed to improving Goals number 2 and 3 (zero hunger and good health) of the Sustainable Development Goals (SDGs). All respondents said they never went to bed hungry. An Overwhelming majority of more than half (87%) said their household never ran out of money to buy food; almost 93% said they never cut the size of a meal, and nearly 95% said they had enough money to buy food. According to the findings, less than a quarter (10%) of respondents buy daily, more than half (69%) buy weekly, and only less than a quarter (21%) buy fruits and vegetables once a month for their household. Additionally, all respondents use healthy and organic products from their livestock farm on a daily basis, such as milk, yogurt, and butter, in their breakfast, lunch, and dinner, which help to complete their nutrients and required calories. The study demonstrated that livestock significantly contributes to SDG 3: good health. 70% of respondents said they

were not facing any chronic diseases, while 30% were wealthy. When asked why were they so healthy, less than half (41%) said it was because they ate pure and healthy food. Some of them—4%—said it was because of the daily work on the livestock farm, and 25% said it was because of the natural environment. All respondents stated that livestock is used to produce healthy products such as butter for breakfast, lunch, and dinner, and households consume an average of 21.0 kg of milk per day; An Overwhelming majority (89%) have access to high-quality health care. Less than a quarter (22%) were getting health services from government hospitals, more than a quarter (34%) from private hospitals, and less than half (44%) from both government and private hospitals; the correlation between livestock and where you get health services is strongly positive.

Quality Education and Livestock

SDG Goal 4 promotes inclusive and equitable quality education at all levels. Consumption of ASFs improves children's cognitive and physical development as well as school attendance and performance. In addition, livestock provide income to poor households to pay for schooling. School feeding programs that include ASF products can help provide proper nutrition to undernourished children (FAO, 2018). Livestock provides high-quality food and cash to poor and disadvantaged households (especially to women) in times of need, serving as an asset, a form of savings, and a safety net (FAO, 2009).

Results also indicated that the livestock sector not only contributes to poverty alleviation but also contributes to increasing the education ratio in the district of Musakhail. According to the findings, almost 95 percent of respondents, their children are getting an education. Less than half (45%) were enrolled in private institutions, while less than half (44%) were enrolled in government institutions. Only 6% of the population was enrolled in madrasas, and only 5% did not receive an education. In schools, the correlation with livestock was (502**), in colleges, it was (0.461), in madrasas, it was (0.434), and in universities, it was (0.472). The correlation was strongly positive. They spend an average of PKR 328,400 per year on their children's education, which is correlated with poverty alleviation (719 **).

Gender Equality and Livestock

SDG Goal 5 seeks to empower women and girls to reach their full potential. Throughout the developing world, women and girls in rural areas are deeply involved in livestock production. However, women livestock farmers typically face greater challenges than men, including economic, social, and institutional barriers. To enable women to meaningfully operate in, and benefit from, the livestock sector, policies and programs should work to remove root causes of

gender inequalities as well as the obstacles and constraints facing women. Doing so could make livestock a pathway out of poverty for millions of rural women and girls. Key areas for policy intervention include developing gender-responsive extension services and participatory training programs for rural women; providing them with improved access to land and productive assets, as well as to markets, credit, and insurance; and fostering their access to labor-saving technologies. Finally, there is a need to collect, document, and disseminate those successful approaches and good practices that have had a positive effect on women's economic empowerment and have been shown to increase gender equality in the livestock sector (FAO, 2009). The livestock sector provides livelihoods for the majority of rural communities worldwide. Globally, about 600 million of the world's poorest households keep livestock as an essential source of income (Thornton et al., 2006).

The findings demonstrated that women have equal opportunities in the livestock sector industry in the district of Musakhail. Almost all of the respondents demonstrated that women's participation in livestock farming is necessary; without women's participation, this sector cannot run successfully. Women's respect and empowerment in their families and society increase as a result of their participation in livestock activities because they have the opportunity to work together equally. All respondents agreed that women can spend the money they earn from livestock farms however they see fit. The majority of respondents said that their women do not have any skill to produce any product from animal skin or wool. All respondents were interested in getting all types of training for women regarding wool and skin product making.

Decent Work, Economic Growth, and Livestock

SDG Goal 8 promotes sustainable economic growth and full and productive employment. The value of livestock production accounts for nearly 40 percent of total agricultural output in developed countries and 20 percent in developing countries (Kanter et al., 2022). Yet the contribution of livestock to overall economic growth through numerous vertical and horizontal multiplier effects goes well beyond simple production (Temoso et al., 2023). In developing countries, however, the livestock sector is highly segmented, and the level of labor productivity differs widely between processing and production processes (Kryszak et al., 2023), and also between commercial and subsistence farmers. Thus, simply multiplying the same kind of opportunities might just result in an expansion of underemployment. Livestock economic growth models should therefore put special emphasis on increasing labor productivity and

focus on high value-added and labor-intensive activities (FAO, 2009). Livestock production makes a major contribution to the global economy, (Visseren-Hamakers, 2020), employing at least 1.3 billion people worldwide and providing livelihoods for 600 million poor smallholder farmers in developing countries (Thornton et al., 2006).

The analysis revealed a positive correlation between livestock and decent work and economic growth, with results indicating that the majority of respondents rely on the livestock sector; on average, three family members, including women, are involved in livestock farming. There was a strong positive coefficient correlation among livestock, decent work, and economic growth. Results revealed that this sector provides job opportunities to the local community not only for males but also for women and disabled people; it helps people reduce poverty and improve their social and economic conditions.

CONCLUSIONS AND RECOMMENDATIONS

Livestock farming plays a significant role in implementing the SDGs in Pakistan. It contributes to reducing zero hunger, good health, quality education, gender equality, decent work, and economic growth. Livestock farmers in the district of Musakhail reported that their livestock farms provide them with enough income for household expenses, increasing their assets and social status. They also reported using healthy and organic products from their farms on a daily basis, such as meat, milk, yogurt, and butter, which help to complete nutrient requirements. The livestock sector also provides job opportunities to the local community, including women and disabled people. However, some challenges need to be addressed, such as a lack of medicine and lack of access to national and international markets, as well as a lack of skills in advanced livestock farming and producing products from wool and skin. To improve the livestock sector, the government, and other relevant departments should provide basic facilities such as free medicine, expert doctors, and veterinary hospitals at the village level, as well as training in advanced livestock farming and product production skills. Providing support to access national and international markets and introducing meat and milk processing units and a high-standard market for animals would also be helpful to farms.

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