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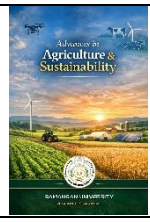

The impact of climate change on the winter-feeding status of livestock in Afghanistan.

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Keywords
Afghanistan, Drought, Livestock, Nutrition, Poverty, winter.

Research/Review Article

Abstract

Livestock farming is considered one of the main sources of livelihood for the people of Afghanistan province. However, successive droughts, insecurity and armed conflicts, and widespread poverty have posed serious challenges to the proper winter feeding of livestock. The main objective of this research is to investigate the status of winter livestock feeding and its associated challenges, and to provide solutions for improving the current situation. The statistical population of this study includes 277 local livestock owners, employees of the Directorate of Agriculture and Livestock, university professors, and environmental personnel, who were selected using a stratified random sampling method. The results show that the winter feeding situation for livestock in Afghanistan is very alarming. The main reasons for this include successive droughts leading to a severe reduction in fodder production for livestock, insecurity and armed conflicts, widespread poverty and lack of financial resources to procure fodder and care for livestock in winter, and a lack of support programs to meet the needs of herders in this region. To save their remaining livestock, herders are sometimes forced to sell their animals at very low prices, which exacerbates the cycle of poverty. It is necessary to take action through humanitarian aid, support programs, efforts to provide fodder, treat livestock, and empower herders in this region.

1. Introduction

This study examines the challenges of winter livestock feeding in Afghanistan province, Afghanistan, and its implications for the livelihood and food security of local communities. Livestock farming is one of the main sources of livelihood in this mountainous and arid region; however, successive droughts, insecurity stemming from armed conflicts, and widespread poverty have severely limited herders' access to fodder and pastures (Nasery, 2018). Through interviews with herders, field observations, and a review of reports from national and international organizations, this study assesses these challenges and their consequences on livestock health and production, and consequently, on the livelihood and food security of local communities.

Afghanistan province, located in northwestern Afghanistan, is one of the country's mountainous and arid regions where most of the population is engaged in subsistence farming and livestock rearing. Livestock farming is considered a primary source of income and protein for rural households in this area (Popal, 2019). However, proper winter feeding of livestock has always been a fundamental challenge for herders (Nasery, 2018). Successive droughts, insecurity due to armed conflicts, and widespread poverty are among the key factors that have restricted herders' access to fodder and pastures, negatively impacting the winter feeding status of livestock (Popal, 2019). This issue can have serious consequences for livestock health and production, and subsequently, for the livelihood and food security of local communities (UNAMA, 2021).

Proper winter feeding of livestock has always been a major challenge for herders in arid and mountainous regions. Droughts, reduction in pastureland, and limitations in water resources are among the primary factors restricting herders' access to adequate fodder. In many arid and semi-arid regions of the world, herders face serious problems in securing appropriate fodder. According to studies by Nasery (2018) and Popal (2019), herders in dry provinces of Afghanistan, including Afghanistan, have faced a reduction in fodder resources and pastures due to recurrent droughts and insecurity caused by conflicts. This situation not only leads to a decrease in the quality of livestock nutrition but also causes a reduction in their productive capacity and health. In the mountainous regions of Afghanistan, herders are mostly dependent on subsistence agriculture and livestock farming. Studies by Whitlow and Hagler (2000) and Lanyasunya et al. (2005) show that in arid and semi-arid areas, winter livestock feeding commonly faces resource scarcity issues, which intensify, particularly during the cold seasons. Under these conditions,

herders are often forced to use alternative fodder sources such as straw, dried plants, and even agricultural residues, which can significantly reduce the nutritional quality for the livestock.

Inadequate nutrition and limitations in feed resources negatively affect not only the health of livestock but also their productive performance. In many arid and mountainous regions of Afghanistan, livestock may suffer from deficiencies in essential nutrients such as protein, vitamins, and minerals due to insufficient feeding. Studies by Scudamore and Livesey (1998) and Gotlieb (2002) indicate that deficiencies in these nutrients can lead to reduced milk production, poor growth, decreased fertility, and increased mortality. Malnutrition in livestock can lead to serious problems in their immune systems, making them more vulnerable to diseases. Furthermore, protein and energy deficiencies can cause a reduction in reproductive capacity and growth rates of livestock, which in turn negatively impacts the livestock economy and household livelihoods. Research by Whitlow (2000) and Seglar (2004) emphasizes that the digestive system of livestock is severely affected by the lack of suitable feed during cold seasons, which can lead to digestive problems and reduced livestock performance.

Drought and climate change have devastating impacts on access to water resources and pastures, ultimately affecting livestock nutrition. In regions with low rainfall and extreme weather fluctuations, herders face fodder shortages during dry seasons. In these areas, arid and desert conditions limit the growth of grasses and plants, forcing herders to use lower-quality fodder resources. Studies by D'Mello (2002) and Amigot et al. (2005) show that due to recurrent droughts, reduced rainfall, and increased temperatures, agricultural products and pastures are directly affected, and herders face shortages of fodder resources and water. This can lead to a decline in livestock production, reduced income, and a lower quality of life for households. In regions like Afghanistan, which are heavily dependent on subsistence livestock farming, these problems can have devastating consequences for the economy and food security of communities.

Significance of the Research

Livestock farming in Afghanistan, Afghanistan, is considered a fundamental pillar of livelihood and food security for local communities. Given that most households in this region depend on subsistence livestock farming and agriculture, challenges related to winter livestock feeding can have widespread consequences on household economies, livestock health, and food security. Recurrent droughts, armed conflicts, and poverty have limited herders' access to fodder and pastures, leading to reduced livestock

production and increased vulnerability of local communities. This research is highly significant in identifying problems and providing effective solutions to improve livestock nutrition and enhance the resilience of herders in critical conditions.

Problem Statement

Afghanistan, one of Afghanistan's mountainous and arid regions, is heavily reliant on subsistence livestock farming and agriculture. Livestock farming is not only the main source of income for many rural households but also plays a crucial role in ensuring the food security of these communities. However, winter livestock feeding has always been a fundamental challenge for herders in this region. Numerous factors such as successive droughts, reduced pastureland, insecurity stemming from armed conflicts, and widespread poverty have led to decreased access for herders to sufficient fodder and nutritional resources. These shortages result in the physical weakening of livestock, reduced animal production, increased mortality, and decreased income for herders, ultimately endangering the livelihood and food security of local communities.

Research Objectives

Main Research Objective:

1. To assess the status of winter livestock feeding in Afghanistan.

Specific Research Objectives:

1. To examine the challenges of winter livestock feeding in Afghanistan.
2. To identify the factors affecting herders' reduced access to fodder and pastures.
3. To evaluate the impact of inadequate nutrition on livestock health and production.
4. To propose practical solutions for improving livestock feeding conditions and enhancing the resilience of herders against climatic, economic, and security problems.

Research Questions

Main Question:

1. What is the status of winter livestock feeding in Afghanistan?

Specific Research Questions:

1. What factors cause reduced access for herders to fodder and pastures during the winter season?
2. What impact do nutritional limitations have on livestock health and production?
3. What are the consequences of these problems for herders' livelihoods and the food security of local communities?

2. Material and Methods

The present article ("Winter Livestock Feeding Status in Afghanistan"), considering the importance of the subject, is a type of significant applied and descriptive study, and scientific criteria have been observed in this research. The present research was field-based. The statistical population for this study comprised 277 individuals, who were selected using a stratified random sampling method. The main data collection sources/methods included: in-depth interviews with 50 livestock-herding households in several villages of Afghanistan; field observations of livestock and pasture conditions; input from employees of the Directorate of Agriculture and Livestock, university professors, and environmental personnel; and a review of statistics and reports from national and international organizations. Data were collected through questionnaires and analyzed using GraphPad Prism Version 7 (Trial) statistical software. The data collection tool for this research was a questionnaire, and the types of questions included multiple-choice, open-ended, and descriptive. Descriptive and inferential statistics such as mean, mode, and standard deviation were used for analysis.

3. Results

Climate change is also as a serious challenge in the livestock industry. Droughts and temperature changes affect water and fodder resources, and this issue leads to a reduction in the quality and quantity of livestock production (Ahmadi, 2023). Additionally, the lack of infrastructure, including roads and local markets, creates problems for livestock herders and hinders their access to markets (Hosseini, 2022).

Livestock Nutritional Problems in winter

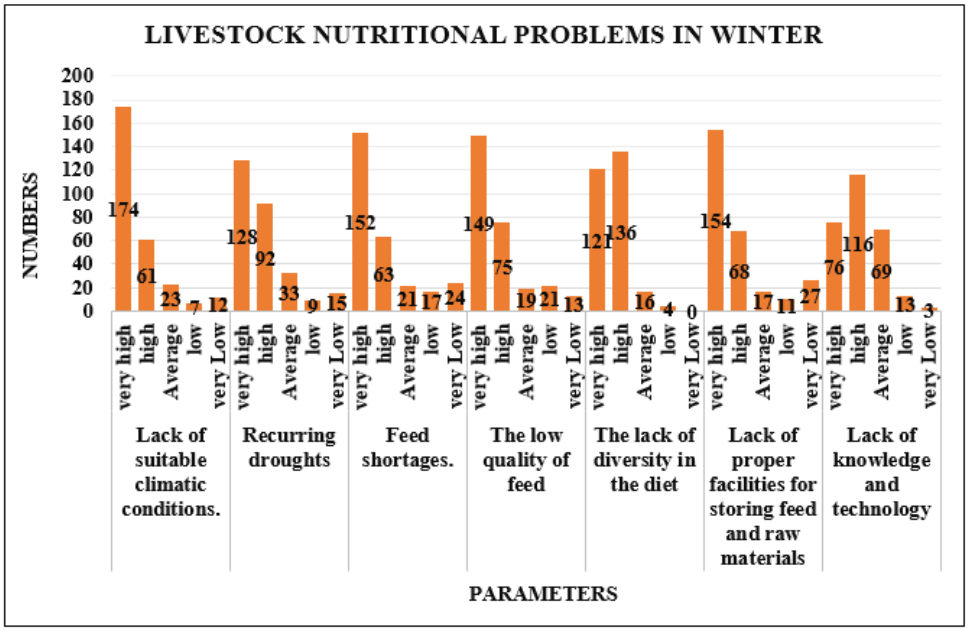

Figure (1) Livestock nutritional problems in winter

The impact of climate and drought, with two factors being unsuitable climatic conditions (62.8% very high) and recurrent droughts (46.2% very high), indicates the system's vulnerability to environmental changes. Infrastructural problems, such as the lack of storage facilities (55.6% very high) and low feed quality (53.8% very high), reflect weaknesses in resource management. Regarding dietary diversity, despite a lack of diversity (92.8% combined high + very high), no respondent rated it as "very low," indicating the uniform importance of this factor for all stakeholders.

Challenges of Pastures and Livestock Feed Resources

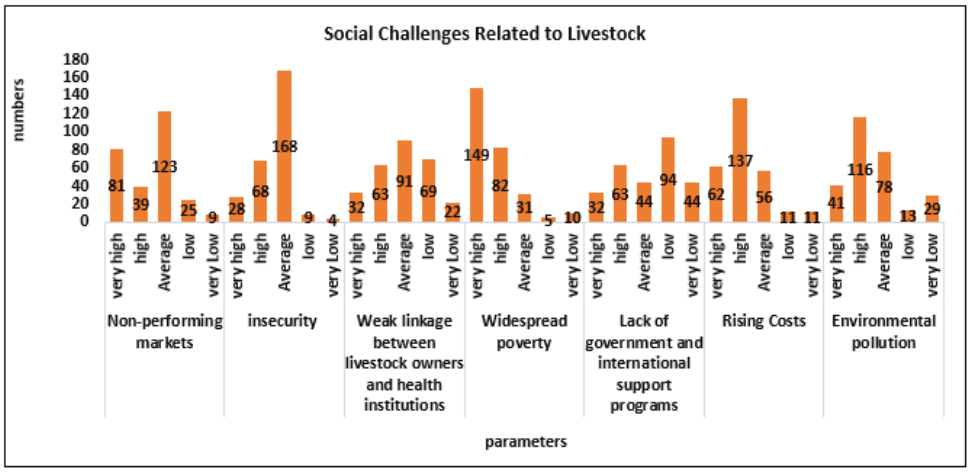

Figure (2) Challenges of pastures and livestock feed resources

- **Shortage of feed resources in dry seasons:** The highest response is at the "high" level (43.7%). This shows a more uniform distribution compared to other factors.
- **Lack of clean and sufficient water (79.7%):** This has a significant impact, with the highest response at the "high" level (60.6%).
- **Overgrazing (83.8%):** The combination of "very high" and "high" levels shows the highest percentage at the "very high" level (59.6%). Only 8.6% considered it of low importance.
- **Degradation of pastures (80.2%):** This is at high impact levels, with 53.8% at the "very high" level.
- **Improper pasture management:** Responses are almost equal at the "very high" (38.3%) and "high" (37.9%) levels, indicating a consensus on the importance of this factor.
- **Lack of nutritional programs (24.9%):** The highest concentration of responses is at the "medium" level, showing the widest dispersion of opinions.
- **Lack of emergency solutions:** 49.5% of responses are at the "high" level, and 23.1% are at the "very high" level.

Overgrazing and pasture degradation have the highest concentration of responses at the "very high" level. Water scarcity is mostly concentrated at the "high" level. Together, the three factors of overgrazing, pasture degradation, and water scarcity account for over 80% of the negative impact.

Improper pasture management, despite high percentages, has the lowest percentage for "very low" (2.2%).

Social Challenges Related to Livestock

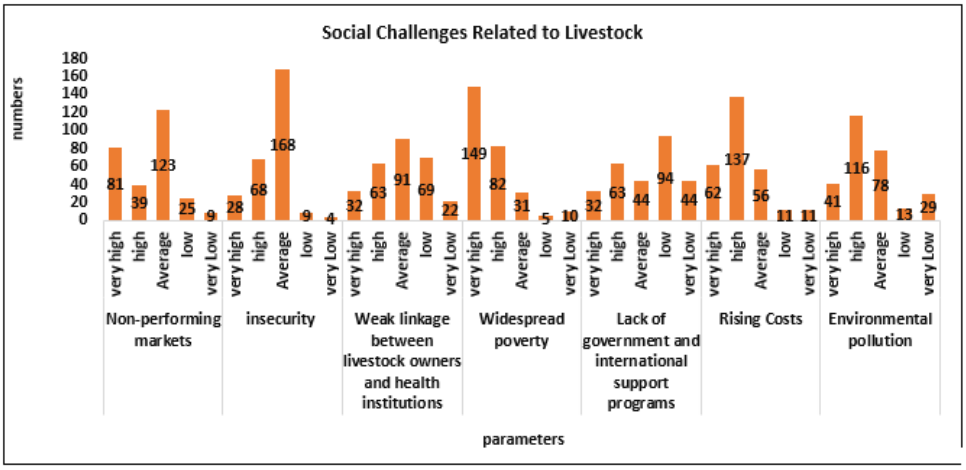

Figure (3): Social Challenges Related to Livestock

Widespread poverty is clearly identified as the most critical factor, with over 80% indicating a negative impact. Although environmental pollution ranks second, 22.3% of respondents rated it as "very low," indicating a significant divergence of opinion. Inefficient markets received the highest number of responses at the "moderate" level (44.4%), suggesting a balanced assessment of this factor. Weak communication with health institutions shows an interesting pattern: 32.9% rated it as moderate, 32.9% as low/very low, and 34.3% as high/very high.

Livestock Health and Sanitation Challenges

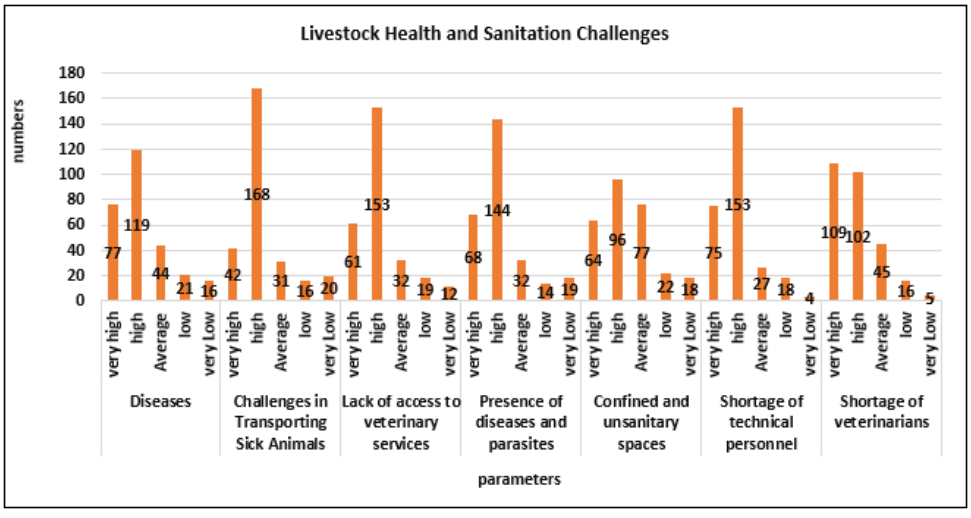

Figure (4): Winter Livestock Health and Hygiene

Diseases with 77 responses indicating "very high" and 119 indicating "high" point to serious issues in this area. Transportation problems with 168 responses indicating "high" show that this is a major concern. Lack of access to veterinary services with 61 responses indicating "high" and 153 indicating "moderate" reflects a shortage of services in this field. Prevalence of diseases and parasites with 68 responses indicating "very high" indicates serious challenges in this area. Limited and unhygienic spaces with 64 responses indicating "very high" and 96 indicating "high" highlight the existence of this issue. Shortage of technical personnel with 109 responses indicating "high" and 102 indicating "moderate" suggests a need for more skilled human resources. Shortage of veterinarians with 153 responses indicating "high" and 27 indicating "low" demonstrates an urgent need to increase the number of veterinarians. These findings point to serious problems related to animal health and care. There is a clear need to improve access

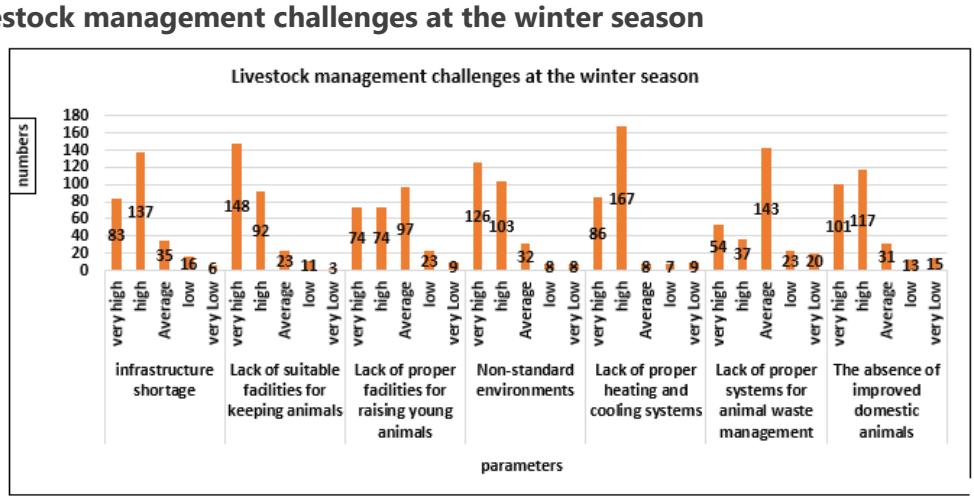

Figure (5): Livestock Management Challenges

The lack of infrastructure has the highest number of responses in the "very high" (83) and "high" (137) categories, indicating a serious problem in this area. The shortage of suitable facilities for animal housing shows 148 responses in the "very high" category and 92 responses in the "high" category, indicating that this aspect is also in poor condition regarding facilities. The lack of appropriate facilities for raising young animals: the distribution of responses shows that the conditions for raising young animals are also concerning. Non-standard environments, with 86 responses in "high" and 167 in "very high," highlight this issue as being of significant concern. The absence of proper heating and cooling systems: the lack of these systems is also in a critical state. Animal waste management, with 126

responses in "very high," requires immediate attention. Unimproved domestic animals, with 97 responses in "medium," indicates that this issue is in a better state compared to other items, but still needs improvement.

Unfavorable climatic conditions, along with recurrent droughts, have led to a shortage of animal feed. The poor quality of available feed and the lack of diversity in the diet exacerbate the nutritional problems of livestock. This situation becomes more critical, especially during the dry and cold seasons when we face a scarcity of food resources. The shortage of clean and sufficient water for animals on one hand, and overgrazing by livestock on the other, have led to the degradation of pastures. Inadequate pasture management has intensified this problem and reduced the capacity of rangelands to provide fodder. Inefficient markets, coupled with insecurity, have made conditions more difficult for herders. Weak communication between herders and health institutions, widespread poverty, and a lack of governmental and international support programs have sharply increased livestock farming costs. The prevalence of animal diseases is exacerbated by problems with transporting sick animals and a lack of access to veterinary services. The presence of parasites and various diseases, along with a shortage of technical personnel and specialized veterinarians, has endangered animal health. The lack of suitable facilities for storing feed and raw materials, a shortage of basic infrastructure, and inadequate animal housing facilities are major problems. Substandard environments with inadequate ventilation systems, limited and unsanitary spaces, and the absence of proper heating and cooling systems have made livestock rearing difficult. The scarcity of appropriate facilities for raising young animals and the lack of livestock waste management systems are significant challenges. A deficiency in up-to-date knowledge and technology, lack of access to improved livestock breeds, and the absence of nutritional programs tailored to the needs of the animals have reduced the productivity of this sector. Furthermore, the lack of suitable solutions for feeding animals in emergency situations has increased the vulnerability of this sector.

Overgrazing, fires, the conversion of pastures to agricultural land, and the absence of appropriate management plans are the main causes of this problem (Bedunah & Angerer, 2012). The lack of regular and efficient markets for buying and selling livestock products is another challenge facing the livestock industry in Afghanistan. This issue has prevented herders from being able to sell their products at a fair

price and earn sufficient income (MAIL, 2015). Climate change, especially in rural areas, negatively impacts the livestock industry. Droughts and temperature changes lead to a reduction in water and fodder resources for animals. This results in decreased production and quality of animals and ultimately a reduction in herders' income (Ahmadi, 2023). The lack of suitable infrastructure, such as roads and local markets, is another major challenge for this industry. Herders usually face difficulties in accessing markets and distributing their products, which leads to increased costs and reduced income (Husseini, 2022). Many herders, due to a lack of access to necessary information and training, use traditional and inefficient methods, which leads to reduced productivity. Many farms use old and inefficient facilities and technologies. This issue causes increased costs, reduced productivity, and environmental problems. Inadequate transportation can lead to increased stress and diseases in animals (Ahmadi, 2023).

4. Conclusion and Discussion

Afghanistan, as one of the mountainous and arid regions of Afghanistan, is heavily dependent on animal husbandry. However, recurrent droughts, insecurity, and widespread poverty have turned winter livestock nutrition into a serious crisis. This article examines the challenges of livestock nutrition in Afghanistan and its consequences for livelihoods and food security. Successive droughts in recent years have had a devastating impact on fodder production in Afghanistan. According to a United Nations report (UNAMA, 2021), reduced rainfall and recurrent droughts have led to a sharp decline in pastures, leaving herders facing a shortage of nutritional resources. Studies by Nasery (2018) and Popal (2019) also show that in arid regions of Afghanistan, herders, due to a lack of fodder, have been forced to use low-quality food sources such as straw and agricultural waste, which leads to livestock malnutrition. Insecurity resulting from armed conflicts has limited herders' access to pastures. United Nations reports (UNAMA, 2021) indicate that conflicts in rural areas of Afghanistan have endangered the movement of herders, and many of them, fearing attacks, are unable to graze their livestock in remote pastures. This issue reduces access to natural fodder and increases dependence on purchased nutritional resources, which are not affordable for many poor herders. Widespread poverty in Afghanistan has limited the ability of herders to purchase fodder and feed supplements for their livestock. According to the findings of this research, many herders, due to a lack of income, are forced to sell their livestock at low prices,

which exacerbates the cycle of poverty (Whitlow & Hagler, 2000). Furthermore, the lack of governmental and international support programs has made the situation more difficult for herders.

Climate change and poor resource management (feed and storage) pose the greatest threat to the studied system. Focusing on sustainable solutions such as environmentally friendly technologies and stakeholder education can be a way forward. Livestock systems face three major challenges: excessive pressure on pastures (overgrazing and degradation), scarcity of water resources, and poor nutrition management. Widespread poverty and environmental pollution are two main challenges, while inefficient markets and connections with health institutions require more careful examination. Proposed solutions should be a combination of immediate actions (poverty reduction) and long-term plans (reforming market structures). The animal health system faces three major challenges: a lack of services and specialized personnel, a high prevalence of diseases, and infrastructural problems (transportation, storage environment). There are serious deficiencies in infrastructure and facilities related to animal husbandry and rearing. The need for planning and investment in these areas is clearly felt, especially in matters related to storage facilities and waste management. Based on percentage analysis, major problems are observed in the areas of infrastructure, storage facilities, and heating and cooling systems. These issues require immediate attention and improvement. The challenges of winter livestock nutrition in Afghanistan, Afghanistan, including problems arising from recurrent droughts, armed insecurities, and poverty, have serious impacts on the livelihoods and food security of local communities. These problems not only affect the health and production of livestock but also negatively impact the income and economic well-being of families. In situations where fodder resources are limited, herders resort to low-quality and alternative sources such as agricultural waste and dry plants, which can lead to reduced livestock performance, decreased milk and meat production, and increased livestock losses. The collective findings of this research indicate that the winter nutrition status of livestock in Afghanistan is very concerning, and numerous challenges, including drought, insecurity, and poverty, overshadow it. This issue has devastating effects on the health and production of livestock, and consequently on the livelihoods and food security of local communities.

Recommendations

1. Increase fodder production and storage: One of the most important solutions for improving livestock nutrition is to increase fodder production during the rainy seasons and store it for use in the winter.
2. Develop sustainable irrigation and agricultural methods: Considering the drought problems in arid and mountainous regions, developing sustainable irrigation methods and optimizing the use of available water resources for fodder production can be effective in improving livestock nutrition and preserving pastures. Also, using modern agricultural methods such as conservation agriculture and cultivating drought-resistant plants can contribute to the sustainability of fodder resources.
3. Train herders in nutrition and resource management: Herders should be informed about the best livestock feeding methods in different seasons of the year, the use of alternative fodder sources, and sustainable resource management through training programs and workshops. This training can help them consume existing food resources more efficiently and utilize agricultural waste as supplementary fodder sources.
4. Preserve and restore natural pastures: One of the most important long-term measures for securing fodder resources is the preservation and restoration of natural pastures. This action can help increase fodder production during rainy seasons and make herders self-sufficient in fodder resources during dry seasons.
5. Strengthen local cooperation and non-governmental organizations: Cooperation between local communities, the government, and non-governmental organizations can play an important role in identifying and implementing development projects such as establishing fodder storage facilities, rehabilitating irrigation systems, and creating support funds for herders. This cooperation can help accelerate the process of solving nutritional problems and improving livelihoods.
6. Provide financial aid and support to herders through micro-credit programs and government subsidies.

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