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Exploring the Value Chains in the Small Ruminant Sector: A brief review of the literature

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ABSTRACT: The current study was conducted in order to deepen the understanding of how small ruminants fit into the economy and enhance the competitiveness of live animals and value-added products. This study focuses on previous efforts to understand what value chains mean in the small ruminant sector, what it really means to deliver value to customers, understand the links between production, marketing, etc. activities of products and services in an effective manner, and the role of value added in providing wealth to all stakeholders who participated. Previous literature was reviewed in detail especially for that included a case study and detailed analysis of the five value chain elements, identification of actors and promoters, horizontal and vertical links, flow mapping through the chain, identification of marketing channels, key challenges and opportunities and review the possible interventions within vertical and horizontal interactions and management structure according to this literature. It was found that strategies for good breeding, improving health care, providing credit, improving markets, improving pasture productivity and rehabilitating them, in addition to the involvement of potential actors and the coordinated efforts of all stakeholders; It will increase the productivity of small ruminants and improve product/market development and thus have sustainable value chains for small ruminants.

Keywords: Value Chain, Value Chain Analysis; Small Ruminants; Challenges; Review

استكشاف سلاسل القيمة في قطاع المجترات الصغيرة: مراجعة موجزة للأدبيات

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المستخلص: أجريت الدراسة الحالية من أجل تعميق فهم كيفية ملاءمة المجترات الصغيرة للاقتصاد وتعزيز القدرة التنافسية للحيوانات الحية والمنتجات ذات القيمة المضافة. تركز هذه الدراسة على الجهود السابقة لفهم ما تعنيه سلاسل القيمة في قطاع المجترات الصغيرة، وما يعنيه حقًا تقديم قيمة للعملاء، وفهم الروابط بين الإنتاج والتسويق وما إلى ذلك من أنشطة المنتجات والخدمات بطريقة فعالة، ودور القيمة المضافة في توفير الثروة لجميع أصحاب المصلحة الذين شاركوا. وجرى استعراض المؤلفات السابقة بالتفصيل خاصة فيما يتعلق بدراسة حالة وتحليل مفصل لعناصر سلسلة القيمة الخمسة، تحديد الجهات الفاعلة والمروجين، والروابط الأفقية والرأسية، ورسم خرائط التدفق عبر السلسلة، وتحديد قنوات التسويق، والتحديات والفرص الرئيسية، واستعراض التدخلات الممكنة في إطار التفاعلات الرأسية والأفقية وهيكل الإدارة وفقا لهذه المؤلفات. وجد أن استراتيجيات التربية الجيدة، وتحسين الرعاية الصحية، وتوفير الائتمان، وتحسين الأسواق، وتحسين إنتاجية المراعي، وإعادة تأهيلها، بالإضافة إلى إشراك الجهات الفاعلة المحتملة والجهود المنسقة لجميع أصحاب المصلحة ؛ سيزيد من إنتاجية المجترات الصغيرة ويحسن تطوير المنتجات/السوق وبالتالي يكون لديه سلاسل قيمة مستدامة للمجترات الصغيرة.

الكلمات المفتاحية: سلسلة القيمة؛ تحليل سلسلة القيمة ؛ المجترات الصغيرة ؛ الأمن الغذائي ؛ التحديات؛ مراجعة

1. Introduction

Small ruminants constitute an economically and ecologically important sector in agricultural systems throughout the developing world (Shah et al., 2015a). They are important for food security (IFAD, 2016), resilience and income generation (Desalegn, 2020) due to their low initial investment costs, low operating cost (CNFA, 2016; Namonje-Kapembwa et al., 2019), and immediate returns because of the short gestation period and the high level of reproduction (Chakraborty and Gupta, 2017; Durmus et al., 2019). In order to address the capacity of sheep and goat farming systems, it is necessary to consider these systems as the production of goods intended for sale, and thus analyze the chain of these products that use them to better understand their sustainability technically, economically and socially (Alary et al., 2009). Understanding the local context of how small ruminants fit into people's lives is also critical to enhancing the competitiveness of live animals and value-added products such as meat, milk, and the hides and skins sector (CNFA, 2016).

The value chain is one of the latest, most popular trends, and powerful methodology for discovering different aspects of the interface of economy and environment as well as a useful complement to material flow or production cycle analysis with wide applicability (Kumar and Rajiv, 2016). Where chain analysis has emerged as a tool to understand the diversification of the food supply and increase income generation opportunities (Shah, 2015a) through increased trade that contributes to enhancing competition (Kumar and Rajiv, 2016), improving market access for all sheep and goat producers, developing livestock and product processing systems by increasing the added value of meat and dairy products for sheep and goats. (Alary et al., 2009).

Although many countries seek to develop agricultural value chains for their important role in increasing food security (UNCTAD, 2013), there is little understanding of the different concepts used in value chain analysis is specifically in developing countries such as Asia and Africa and how smallholder farmers can participate in these value chains (Reddy, 2013). This lack of understanding hinders the development of agricultural value chains, which are crucial for increasing food security and income generation opportunities for smallholder farmers. There is a need to clarify the concepts and potential benefits of value chain analysis in the small ruminant sector and explore the role of value addition in creating wealth for all stakeholders. The main objectives of this work are to explore the concept of value chain analysis in the small ruminant sector; to identify the potential benefits and challenges of value chain analysis in the small ruminant sector, including its impact on food security, income generation, and market access; to examine how to add value in the small ruminant value chain and its potential to enhance competitiveness; to review the existing literature on value chain analysis in the small ruminant sector and summarize key findings and recommendations; and to provide insights to promote the development of sustainable and inclusive value chains in the small ruminant sector.

2. Study Design

To conduct the literature search, we employed a systematic approach in selecting appropriate search terms. These search terms included keywords such as "small ruminants," "sheep," "goats," "value chains," "value chain analysis," "challenges," and "potential interventions." In order to ensure a comprehensive search, we did not limit our investigation to specific sources. Rather, we included a wide range of materials, such as scholarly articles from academic journals, master's and doctoral theses, book chapters, conference papers, and technical reports. The timeframe for our search extended up to the year 2023. In total, we reviewed 85 published papers, 63 of which were published within the past 10 years.

The first section of our paper focuses on providing a conceptual framework for understanding the value chain, with a specific emphasis on the small ruminant value chain. To support our discussion, we referenced 25 relevant sources. In the second section, we delve into analyzing the small ruminant value chain and characterizing the various actors involved in these chains. This analysis was informed by our review of 58 pertinent references. Moving forward, the third section examines the primary constraints that hinder the development of small ruminant value chains, as well as potential interventions proposed by 29 relevant studies. Finally, the last section briefly explores the impact of climate change and the presence of refugees on small ruminant value chains. Additionally, we address the sustainability of these chains in light of the challenges they face, drawing insights from the findings of 14 pertinent studies.

3. Value Chain Analysis: Concepts and Importance

Value: The key to the concept of the value chain is the idea of adding value at each stage through natural sequence of operations (Zamora, 2016), and this value addition can be measured and distributed along the chain (Obaida, 2019). These values should be examined through participatory processes involving multiple stakeholders (Elliott, 2017). The concept of value in the value

chain is multifaceted, complex and loose term (Clark, 1915; Intemannm, 2015; Kumar and Rajeev, 2016) as many has failed to find a comprehensive and complete definition of it (Clark, 1915, Kumar and Rajeev, 1996). Although there are different opinions regarding value as a quantity or a rate, Clark (1915) favored considering the rate between goods and quality as two expressions of the same concept, which is value. Moreover, Ravald and Gronroos (1996) defined value as the ratio between the expected utility of the consumer and the perceived sacrifice. According to Kumar and Rajeev (2016), some economists consider value to be completely dependent on its cost, while others have assumed that value is the condition that motivates people as per the prevailing culture and which emphasizes the ultimate needs, requirements, wants and demands of the consumer. Ravald and Gronroos (1996) supposed that customer satisfaction and consumer confidence can be improved by adding more value to the core product (improving product quality, including supporting services into the offering, etc.) Therefore, as value is the base of the value chain, high value delivery, perceived value to the customer and life time value of the customer are the main elements in the value chain (Kumar and Rajeev, 2016). Based on the above, added value refers to the process of increasing the value of a product or service at each stage of the value chain through a natural sequence of operations. Although the comprehension of value encompassed within the value chain is intricate and heterogeneous, it can be ascertained as the condition that propels individuals based on cultural and consumer requisites.

Value Chain: The term value chain is one of the terms used in the field of business administration that appeared in the fifties by Lawrence Mill (Obaida, 2019) and developed by Porter (Zamora, 2016) to express the series of activities that can contribute to improving the value of the final products (Strakova et al., 2021). Miller and Jones (2013) defined value chains as "a number of interconnected actors in the chain, and a number of multiple and successive activities". Others described it as the full range of activities required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers and final disposal after use (Kaplinsky and Morris, 2000; Webber, 2007; Reddy, 2013; Shah et al., 2015a). According to Wang and Gu (2022), the value chain is a dynamic process of continuous upgrading to create value. For Vroegindewey and Hodbod (2018) value chains are the set of sequenced value-creation activities that convert raw materials to final products, and the institutions that link different production nodes. According Shah et al. (2015a) and Shah et al. (2015b) value chains provide a valuable visual framework for understanding linking farmers to input suppliers, processors, traders and end consumers where it includes the entire range of activities from production to consumption covering transformation and services along with all vertically interconnected processes that generate value for the consumers, as well as the horizontal links of value chains that provide intermediate goods and services, i.e., creating value and incremental value allocation among chain stakeholders. Obaida (2019) explained that the value chain consists of two basic groups of the basic activities arranged in a way that shows the sequence of these activities and the links between them, so that the first group is called the basic activities, and the second group is called the supporting activities. He summarized the importance of the value chain in: controlling cost across each part of the chain, understanding and determining the nature of activities within the chain, and monitoring and evaluating performance across all activities within target cost objectives. Pérez and Oddone (2016) stated that every company or producer, regardless of its size, participates in at least one local value chain. Zamora (2016) stated that to determine the factors that influence the quality of the value chain, it is necessary to understand the interactions within the chain.

Agricultural Value Chain: The concept of the agricultural value chain includes the full range of activities and participants involved in moving agricultural products from input suppliers to farmers' fields and down to the consumer's table (Miller and Jones, 2013, Reddy, 2013). Each participant or value process in this chain has a to the next so that it forms a complete and viable chain (Miller and Jones, 2013). By understanding the entire production-to-consumption system, it is possible to determine how marketing and value-adding activities are carried out and who is involved in and how much is benefited from these activities (Reddy, 2013). The unbalanced agricultural production chain adds an additional cost to the commodity and also puts a negative pressure on the viability of the agricultural sector and its ability to become part of the solution to the problem (Pal and Sharma, 2018). The livestock and livestock products' value chain and its objectives are essential to developing the concept of learning, investment, market access, sales and quality assurance (Barua and Rahman, 2021). The small ruminant value chain is characterized after a participatory value chain analysis for agricultural commodities by mapping the actors, identifying issues and limitations, thus suggesting possible interventions within the vertical and horizontal interactions and governance structure (Purcell et al., 2008; Shah et al., 2015a, in Shah et al., 2015b). According CNFA (2016), the small ruminant value chain mainly consists of three main parts: live animals for home consumption, which are usually slaughtered outside the slaughterhouse; live animals intended for slaughter in consumer markets; and live animals intended for breeding, this trade is mainly carried out with the trade of other animals. For example, sheep value chains include all the inputs and

services that enable the production of live sheep (feed, services and stock), through the transmission, processing and marketing of outputs, to the creation of value-added products such as meat through the consumption of animal source foods and related products (Duguma et al., 2012).

Supply Chain Vs Value Chain: The concept of value chain originated from the supply chain and there is a temptation to use "value chain" and "supply chain" interchangeably (Reddy, 2013). Although both concepts describe the same network of companies that interact to provide goods and services, but there is an important difference in the concepts (Webber, 2007). The value chain concept clarifies that the value is created at each stage of the chain and which has a vital role in satisfying consumers (Webber, 2007; Kumar and Rajeev, 2016). Meanwhile, the supply chain model focuses on the activities that bring raw materials and sub-assemblies into the manufacturing process smoothly and economically, primary on cost and efficiencies in supply (Webber, 2007; Reddy, 2013). Supply chains are complex and involve a number of key operators and links to ensure they operate efficiently (Star et al., 2021). The quality of the value chain lies in the addition of value while in the supply chain, the flow in the supply chain that reflects the quality of the supply chain is the distribution of value (Wang and Gu, 2022). Value chain analysis looks at every step from the raw material to the end user and the goal is to deliver maximum value to the end user at the lowest possible total cost (Fig. 1). On the other hand, supply chain activities include moving resources from one place to another, while the value chain is primarily concerned with providing value for the price product or service (Reddy, 2013). The supply chain arrangement begins from the stage of product demand and ends when it is delivered to the customer, unlike the value chain that starts from Customer order and finish with product (Reddy, 2013; Kumar and Rajeev, 2016). According to Obaida (2019), the difference between the term value chain and the term supply chain is that the supply chain is the process of integrating all parties involved in meeting a customer's demand, while the value chain is a set of interrelated activities that a company uses to create a competitive advantage. Relationships between key actors in supply chains also determine the share of value of the final product that farmers and other actors receive (Barling et al., 2022).

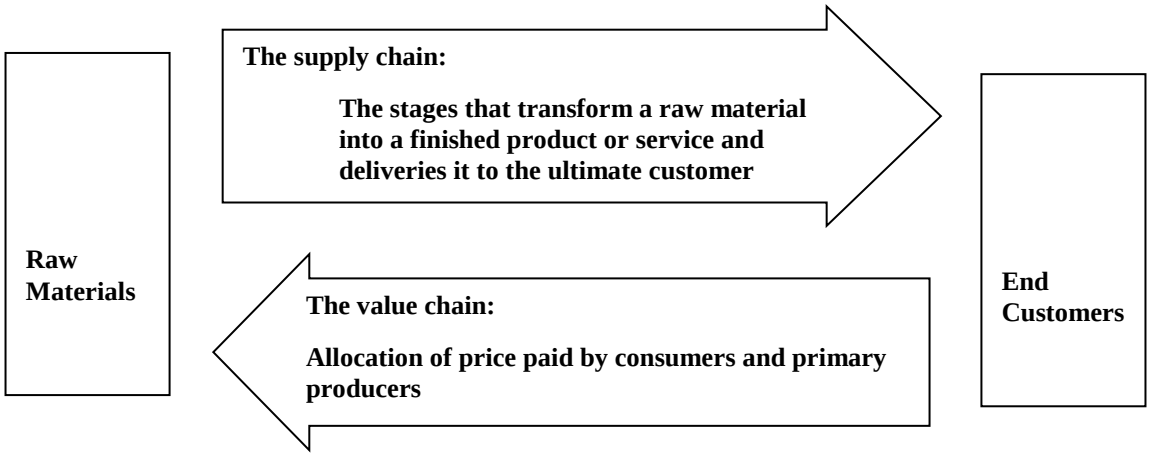

Figure 1: Supply Chain and Value Chain (Reddy, 2013)

Value Chain Analysis: Since the 1950s, "chain analysis" concepts and methods have been used as a tool for strategic analysis in order to explain the strengths and weaknesses (Webber, 2007; Shah et al., 2015a; Shah et al., 2015b; Obaida, 2019) and mechanisms of the relationship between stakeholders involved in the production, processing and distribution of a product or group of products (Alary et al., 2009). Where it provides insight into the value an organization can provide to the customer through increased efficiencies, cost reduction, performance improvement (Webber, 2007; Pérez and Oddone, 2016; Obaida, 2019). Moreover, it provides an analytical and diagnostic tool for identifying rewarding and meaningful income-earning opportunities for poor families in the rural developing world (Shah et al., 2015b). Miller and Jones (2013) defined value chain analysis as the evaluation of people, relationships, constraints, and opportunities. Value chain analysis includes the full range of activities, from production to consumption, covering transformation and services. As stated by Zamora (2016), value chain analysis has been used to examine and evaluate entire industries and industry groups, as well as specific systems within companies. Value chain analysis seeks to describe how chain activities are carried out and to understand how value is created and shared among the participants in the chain as there are needs to add value at each stage which helps differentiate it from competitors at cheaper and better quality (Shah et al., 2015a; Kumar and Rajeev, 2016). Obaida (2019) summarized the main axes on which the value chain analysis depends to include: first: reviewing the value chain for each product in terms of the different activities involved in the production process to determine its strengths and weaknesses, second:

review the links that make up the value chain for each product, which express the relationships between the performance of a value activity (for example, marketing) and the cost of another activity (for example, quality control), and finally: reviewing the potential interrelationships between the value chains of the different production lines. Reddy (2013) explained that as markets evolve, value chains become more complex with more competing channels for both inputs and outputs with a wide range of participants from small farmers to transnational retailers with a wide range of technologies in value chains. he also mentioned that understanding the value chain is important as it explores why farmers choose a particular type of input, and purchase them in light of institutional and market infrastructure and demand and value chain maps help to understand these chain actions across the value chain.

4. Analysis Model of Small Ruminant Value Chain

Under the value chain concept, all key stakeholders of small ruminants are identified along with their roles and functions, in addition, appropriate grading strategies for the chain are identified and counted (Kateko et al., 2013). According to Chakraborty and Gupta (2017), the livestock value chain consists of different activities namely inputs, production, processing, distribution and consumption. As for the rapid assessment of the small ruminant value chain, the five main components of the value chain were; the provision of inputs, the production of small ruminants, the marketing of live and processed animals (slaughter) and the marketing of meat (Shah et al., 2015a). The value chain concepts are applied across the five core elements of the small ruminant value chain (input supply, production, live animal marketing, processing, and product marketing and consumption) which analyzed within the input-output structure, which is represented as a set of value chain boxes connected by arrows, showing the flow of tangible and intangible goods and services (Shah et al.,2015b; Duguma et al., 2012; Awad et al., 2023a; Awad et al., 2023b). The detailed characteristics of activities and actors across the five components of the small ruminant value chain are shown in Figure 2 (Dugma et al., 2012).

In Ethiopia the actors in the goat value chain have been identified such as herders, input suppliers, local butchers, restaurants, local traders, retailers, subnational traders, national traders, exporters, and facilitators (Nigussie and Hoag, 2017). The goat value chain in Uganda includes a variety of actors involve, namely input dealers, producers, traders and butchers (Ilukor et al., 2020). In South Africa the players in the wool industry are the commercial, emerging and community wool growers (Mofo, 2021). the main players in small ruminant value chains in the southern rangelands of Kenya were: small ruminant producers, i.e. individual producers or farmers; input suppliers, i.e. agricultural, veterinary and chemical shops, feed manufacturing and processing industries; supporting institutions, i.e. some non-governmental institutions (NGOs), agricultural research institute, state research body operating in most provinces, Ministry of Livestock Development, government department and focal point of animal extension services in all provinces; some faith-based organizations that are supported by the expert guidance providers they employ; intermediaries, i.e. livestock brokers who operate at all levels of the chain; slaughterhouses, i.e. slaughterhouses and boards where small ruminants are slaughtered and processed; butchers, i.e. meat shops, which are the main outlets for processed and unprocessed meat for consumers; Consumers represented by individual households, small hotels, large hotel chains, institutional consumers and hospitals. It was clear from the results that the medium was a major player at all levels of the chain especially in the marketing of small ruminants and their products (Kateko et al., 2013). In Spain, the main players in the wool value chain are producers, processors and consumers; the breeder usually sells his batches of wool to regional traders responsible for transporting and storing it, or sells it directly to wholesalers (Bilbao et al., 2018).

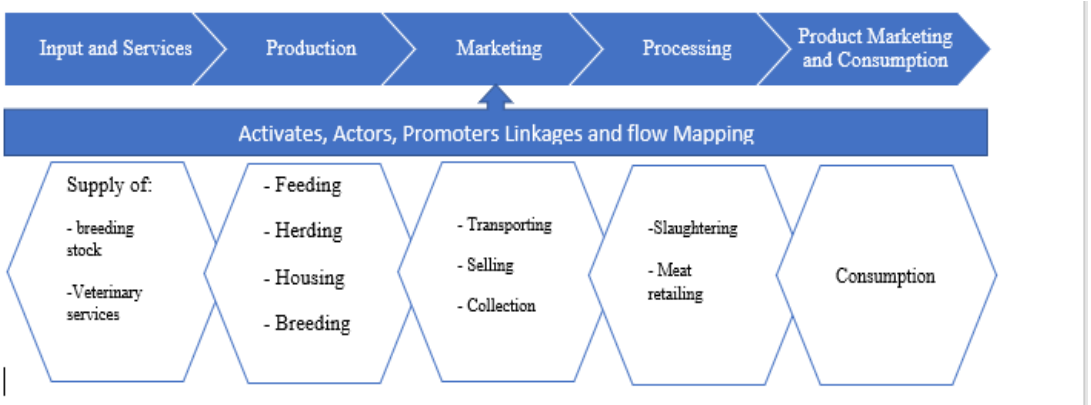

Figure 2. Core Processes, Function and Actors in the Small Ruminant Value Chain (Dugma et al., 2012)

5. Characterization the Core Activities of Small Ruminant Value Chain

The small ruminant value chain is characterized by mapping the actors, identifying issues and constraints, and thus suggesting possible interventions within the vertical and horizontal interactions and governance structure (Shah et al., 2015a; Awad el al., 2023a; Awad et al., 2023b).

5.1. Input Supplies

Each link in small ruminant value chain depends on the goods and services inputs in order to enable it to perform its role at different stages (Wilson, 2018), which are provided by bodies with specialized knowledge (IFAD, 2013). In general, under traditional small subsistence farming and small ruminant chains, the input supply is often underdeveloped (Shah et al., 2015b). These inputs include land, labor, live animals, veterinary supplies, feed supply, transportation, energy, finance and institutional support (Wilson, 2018). For example, the critical inputs required for meat and dairy production in Liberia were: animals, feed, water, and veterinary medicines/vaccines (Touray, 2017). In Horo district of Ethiopia the inputs supply for sheep production included: selection and distribution of breeding rams, provision of veterinary services and the improvement of breeding skills (Duguma et al., 2012). While small ruminant input supply in Pakistan's Chakwal district included breeding stock, buck/ram breeding supply, processed feed supply along with extension and credit services, and these input supply has been found to be informal. The formal system there was restricted to veterinary services from the public and private sectors only (Shah et al., 2015a). In the North-Eastern Badia and in Al-Ruwaished Distrcit of Jordan the small ruminant input supply were: feed and water; veterinary Services; source of breed; and abor (Awad et al., 2023a; Awad et al., 2023b).

Live Animals Inputs: Goats and sheep are often the main assets of poor farmers and herders and constitute an important source of daily cash, meat and dairy because they act as an informal "bank" due to the way assets can easily be sold for cash during household crises (Barua and Rahman, 2021; CNFA, 2016; Kassahun et al., 2020). The selection of individual animals for breeding, particularly ewes, is related to adaptability and suitability given feed resources and compatibility with the local environment and market requirements (Shah et al., 2015a, Shah et al., 2015b). Other important aspects to consider when choosing for both males and females include: health, frame, color and appearance (Shah et al., 2015a, Shah et al., 2015b). Likewise, breed, milk production, and especially litter size are the main criteria for keeping or buying new breeding breeds (Shah et al., 2015a, Shah et al., 2015b; Awad et al., 2023a; Awad et al., 2023b). In the irrigated and semi-desert ecosystems of the Bahawalpur region of Pakistan, farmers are essentially replacing herds of livestock from within their herds with little input from outside. The majority of young females are kept to replace or enlarge the herd. Ewes are usually kept for 3 to 6 breeding seasons before being sold as cull animals (Shah et al., 2015b). This is largely consistent with the situation in the Chakwal region of Pakistan where the main sources of small ruminants come from the farmer's own herd or from fellow farmers and neighboring villages. Males are mainly selected from their flocks and owners of large flocks tend to keep one male for breeding purposes (Shah et al., 2015a). In Lebanon, the majority of goat breeders raised the local goat called "Baladi" and almost of sheep breeders raised the Awassi breed (MercyCrops, 2014, Hosri et al., 2016). Purchasing from the local market and self-production are the reported sources of all production inputs for sheep and goat breeding in northeastern Syria of an agricultural nature (Care and IMMAP, 2018). The situation is similar in Jordan, where the farmers of the North- Eastern Badia an Al-Ruwaished District in kept mainly Awassi sheep (Awad et al., 2023a; Awad et al; 2023b).

Animal Health Services: The presence of veterinarian extensions is the key to the successful improvement of the livestock sector, especially for small ruminants (Namonjo-Kapembwa et al., 2019). notwithstanding that, only main veterinary inputs and services are traded in Bahawalpur District in Pakistan, where public health services were restricted to the resources available for movement and were mostly limited to clinics and veterinary centers. As for veterinary services in the public sector, it was represented in purchasing veterinary medicines, dewormers, artificial insemination tools, etc. (Shah et al., 2015b). In lebanon, the number of suppliers specializing in small ruminant equipment is very limited due to lack of demand, and not all items are available (Hosri et al., 2016). As for supplies of animal health services in Chakwal region of Pakistan, public and private animal health services were provided, where veterinary medicines, deworming, IVF tools, etc. are purchased centrally at the district level and distributed to veterinary centers and dispensaries. Several veterinary hospitals operate in the area. The village veterinary assistants used to keep routine medicines and provide them to the breeder at the doorstep Shah et al. (2015a). In the Beitbridge District of Zimbabwe, the supply of veterinary medicines consisted of both the State Veterinary Department and private companies providing animal health products and providing animal health related services to clients (Dube et al., 2017).

Financial Services: Financial services such as credit are of particular interest to smallholders who lack the capital to invest in businesses (IFAD, 2013). These credit services may come from private banks, individuals or microcredit development institutions (IFAD, 2013). Use of credit service significantly and positively affects market participation and level of participation in the small ruminant market, as it can be argued that those farmers who have access to formal credit are more likely to participate in the small ruminant market than those who do not have access to formal credit (Kassahun et al., 2020). Shah et al. (2015b) have shown that the size of livestock, especially small ruminants, is what determines the creditworthiness of farms in Bahawalpur district, and small ruminants are treated as cash deposits and easily salable commodities by farmers, as compared to other assets and even larger animals. In Chakwal distrcit in Pakistan, there were no formal and specific credit services for sheep and goat production and some NGOs used to provide credit to small ruminants, and the small ruminants act as collateral for loans from informal sources of credit at the village level (Shah et al., 2015a). Rural microfinance institutions, family asset building programs and rural savings and credit associations are the main sources of credit for sheep and goat producers in Ethiopia, even so, the payment mechanism and the low levels of farmers' awareness of the terms and conditions of these institutions are obstacles to financing services there (Legese etal., 2014). Most of the credit available to farmers in Liberia comes from informal intermediaries whose upfront financing is characterized by exorbitant interest rates (Touray, 2017).

Labor: Many food value chains depend on low-paid migrant labor (Barling et al.,2022). Spouses often work as a team and children are a temporary workforce in farming system (Wijers,2019). Similarly, small ruminants labor was largely familial in Chakwal and Bahawalpur districts in Pakistan (Shah et al., 2015a, Shah et al., 2015b). Regarding Northeast of Syria, the labor is generally familial (Care and IMMAP, 2018). Low-input pastoral systems in marginal arid regions of Mali depend on family labor too (ILRI et al., 2011). While family labor constituted 64% of small ruminant employment in the North-Eastren Badia of Jordan (Awad et al., 2023a).

Feed Supply: Pasture and forage materials are considered the main component of small ruminants' diet (CNFA, 2016). According to Shah et al. (2015a), concentrated or processed feed for small ruminants is rarely traded. There was a similarity of feed supply in Chakwal and Bahawalpur districts in Pakistan where there was no special feeding system or production of special feed for small ruminants or a supply of concentrated feed was common for small ruminants where the demand for feed in the two areas was very seasonal and was increasing before Eid al-Adha (Shah et al., 2015a, Shah et al., 2015b). Generally, groundnut straw and wheat straw are the main feed available in in Chakwal district of Pakistan (Shah et al., 2015a). While the feed ingredients available in Bahawalpur district are wheat bran and corn kernels, where, green fodder was used mainly in irrigated areas, while in semi-desert sites, green fodder was used only in family-level and sedentary system agriculture (Shah et al., 2015b). In Lebanon sheep and goats in coastal and mountainous regions are mainly raised in large-scale systems with different levels of concentrated supplementation. Supplementary feed covers only 10% of the total annual dry matter consumption of small ruminants as it is mainly used during critical periods such as the cold season (Hosri et al., 2016). Although the fattening of sheep is becoming more widespread in Sahel- Accelerated Growth, compound feed and nutritional supplements are available but considered costly (CNFA, 2016). Grazing dynamics are the result of complex interactions between animal, site, and range vegetation characteristics (Shah et al., 2015a). The nutrients intake of grazing ruminants and the vegetation were determined by grazing process (Shah et al., 2015a). In southern rangelands of Kenya (semi-arid lands), small ruminants are mainly grazed on available natural pastures. However, the quantity and quality of fodder available from natural pasture has seasonal fluctuation (Katiku et al., 2013). The rangelands, existing trees, fallow lands and fields after harvesting crops are the main sources for grazing the livestock in Chakwal district in Pakistan (Shah et al., 2015a). In Bahawalpur district in Pakistan, grazing was one of the main sources of feed in semi-desert area and it was also found to be important within irrigated areas. Grazing on uncultivated, common lands, and along the road/ canal sides was common in irrigated villages (Shah et al., 2015b). With regard to animal feed and natural pastures in northeastern Syria, private production and the local market are the sources of fodder there. Pasture areas are available for grazing during the warm season, especially in the post-harvest barley and wheat farms, which are mostly rented. During the cold season, farmers provide various rations to their flock to make up for the lack of green pastures. With the limited financial capacity of the ranchers keeping the daily feed up to standard is a huge challenge as a result, many livestock owners have had to reduce their feed quantities to less than one kilogram of a mixture of barley, hay and dry bread (Care and IMMAP, 2018). In Algerian mountain region, the use of the rangelands is daily and throughout the year. For the complementation, which consists of wheat bran and a mixture of barley-corn (Mouhous et al., 2021).

5.2. Small Ruminant Production (Management)

Good management practices in terms of appropriate nutrition, health care and breeding play an important role to improve production (Chah et al., 2013). In South Africa, many activities are implemented at farm level to improve the quality of wool produced such as ensuring adequate water supply; pasture quality control; supplemental nutrient feeding; providing appropriate vaccinations; provide shelter for pregnant ewes, lambs or newly sheared sheep in cold weather (Mofo, 2021). Still though, sheep and goats are traditionally raised in most countries which greatly hinders the income of animal farmers (Khaskheli et al., 2020).

Animal Housing: The housing structure of livestock is indicative of the management criterion for small ruminants. Providing a suitable housing system is probably the most effective way to protect sheep and goats from adverse weather conditions and the materials of roofing and flooring should be selected according weather factors and must be cost effective and made from locally available resources (Wadhwani et al., 2016). Adequate housing is important for better care, as well as improved productivity (Shah et al., 2015a) where the lack of good sanitary conditions increases the prevalence of animal diseases (Shah et al., 2015b, Wadhwani et al., 2016). In housing management, flooring in particular is an important aspect for small ruminants, which provide comfort and hygiene with minimal risk of injury ultimately providing better health coverage, improving their growth rate and productivity (Wadhwani et al., 2016). In Yabello District, Borana District, Ethiopia, herders are realizing that poor housing has a negative impact on animal productivity. But they do not understand the severity of the harm caused by housing different types of animals of different ages in one house (Hussen et al., 2013). In the Chakwal district of Pakistan, the majority of farmers, especially those with larger herds, had temporary structures (kacha prepared with mud) or fenced bushlands. Typically, a single shed or room was used for small ruminants, and large farmers also prepared separate places for keeping young animals (Shah et al., 2015a). Traditional housing practices prevailed on both small and large farms in the Bahawalpur district region of Pakistan where few or no pens are more common and livestock are not protected against cold in winter and heat in summer and open areas, tree shades, shrubs and temporary structures were commonly used for keeping small ruminants. On the small family level, a small part of the farm is allocated to small ruminants. Most had roofs for canopies, while the floor was devoid of any kind of sidewalk (Shah et al., 2015b). The housing in the two areas did not have the appropriate sanitary conditions (Shah et al., 2015a; Shah et al., 2015a).

Breeding and Reproduction: Small ruminants are seasonally polyestrous species, so that present a seasonal pattern of reproduction, to ensure that lambs and kids are born at the optimal time of the year in terms of feed availability and optimal temperature (Abecia, 2019). The breeding season is highly dependent on the availability of forage as it improves during the spring as the remaining grazing supplement the forage resources, increasing the incidence of estrus and breeding (Shah et al., 2015a). Wilson (1989) stated that better performance is achieved in traditional systems where breeding is uncontrolled. According to Flamant et al. (1979), in environments where adaptation is critical, natural selection favors the development of animals with a balance among reproduction, growth rate, and maintenance requirements. They pointed out that crossing locally adapted breeds with breeds selected for higher performance can upset this balance (Flamant et al., 1979). As they also added that even selection for performance within the adapted breeds may result in a loss of adaptation, though less so than from crossing with exotic breeds. The possibility of changing the genetic potential of animals highly adapted to a particular environment is therefore limited unless environmental constraints are reduced (Flamant et al., 1979). In Bahawalpur district of Pakistan, small ruminant breeding was quite natural, where no organized breeding was practiced there. Crossbreeding and breeding with the non-descript mother during grazing and admixture was a potential threat to the loss of breed identity and productivity due to undisciplined breeding practices. However, shepherds used to keep a special father, and they had good traits that helped them improve the breed and try to control the breeding (Shah et al., 2015b). In Chakwal district in Pakistan, no controlled breeding was practiced due to mixing breeding stocks and easy availability of bucks/rams in the area, and there was some seasonality in the breeding pattern. The history of both parents along with physical examination is the main method for selecting a male breeding and is mainly related to the state of the body. The selection of ewes was mainly based on the number of children per birth and the number of live births in a given time period (Shah et al., 2015a).

Animal Health Care: Poor husbandry practices and inadequate veterinary services are major factors that contribute to the spread of livestock diseases (Otaru and Iyiola-Tunji, 2014). Preventing diseases through good husbandry practices is more effective than trying to treat sick animals, where good management practices are vital to disease prevention, and these practices include clean water, proper nutrition, and maintaining clean housing (Otaru and Iyiola-Tunji, 2014). Katiku et al. (2013) mentioned that undernourished animals are susceptible to disease and parasites and, in extreme cases, lose body weight and can die. As for the most prominent measures and practices necessary to limit the spread of diseases among small ruminants, according to Otaru and Iyiola-Tunji

(2014) are: biosecurity that includes isolating new animals from the herd or livestock returning from the market or from other places, disease control, one of its most important strategies is quarantine and slaughter in case the disease is contagious, and using periodic vaccinations in correct route (Otaru and Iyiola-Tunji, 2014). According to Chah et al. (2013), the small ruminants herders in Anambra State of Nigeria had basic knowledge on health care for their animals, and the diarrhea was the most frequent health problem in their flocks. In Chakwal district of Pakistan, veterinary health care was not up to standard and there was a lack of awareness of the importance of veterinary health care, especially among small farmers. The farmers had the local veterinary assistant or the veterinary officer in case of problems, who were providing the service at the doorstep. There is also no regular vaccination service with a clear schedule available to farmers while commercial farmers vaccinate their animals fairly regularly to avoid high mortality rates. For diseases, enterotoxemia (ET) was reported as the main disease, resulting in a high mortality rate (Shah et al., 2015a). In the Bahawalpur district of Pakistan, a higher level of immunization coverage was achieved by pastoralists compared to small-scale farmers. However, seasonal vaccination was practiced depending on the services available. The main diseases reported in the region are: anthrax, pleural pneumonia, goat/sheep pox, and fluke liver (Shah et al., 2015b). The previous two districts shared other issues related to management, hygiene, ticks, worms, mastitis, and nutrient deficiencies. Management practices, including co-grazing, mixing of flocks, improper housing and poor sanitation were other factors cited as causing disease and parasitic infestation (Shah et al., 2015a, Shah et al., 2015b). Small livestock production in Zambia is mostly affected by high morbidity and mortality rates. Control of diseases and ticks in young animals is often limited to traditional methods of disease control (Namonje-Kapeembwa et al., 2019).

Small Ruminant Production System: The terms "production systems" and "management" can be used interchangeably to refer to the means of raising livestock (Otaru and Iyiola-Tunji, 2014). Grazing is in the fact the main feeding practice in raising sheep and goats (Shah et al., 2015a). However, the intensity of grazing varies with flock size (Shah et al., 2015a). There are three basic systems for raising sheep and goats. They are: extensive, semi-intensive and intensive systems (Otaru and Iyiola-Tunji, 2014). The semi-extensive system is the main system for the production for dairy small ruminants in the Bekaa plains in Lebanon, where shepherds temporarily settle in the highlands, with supplementary fodder provided for animals during the spring and summer, in addition to the semi-intensive system, which includes daily feed supplements with limited grazing (MercyCorps, 2014). In low rainfall and in medium rainfall sites in Chakwal district of Pakistan, the main production' system is sedentary. The availability of feed resources is greatly affected by having large flocks and by a dependence on grazing. Overall, a mixed crop-livestock farming system with small landholdings was quite common in both sites. Mainly the farmers have crop-livestock mixed system with small and large ruminant keeping (Shah et al., 2015a). In Bahawalpur district, where irrigated and semi-desert ecologies, the production systems were nomadic, transhumant, sedentary and household productions (Shah et al., 2015b). In Niger, small ruminants operate under extensive, transhumant, with sedentary fattening operations and the majority of these animals were raised in extensive systems where the animals graze either on pastures near the home or far into open range. Increasing numbers of small ruminants are reared in semi-intensive systems with additional feeding occurring periodically, mainly with crop residues and sometimes with purchased bran or other feed (CNFA, 2016).

Feeding Regimes: According to Khaskheli et al. (2020), the quality and efficiency of small ruminants' production can be tampered with through feeding practices, where forage production and feeding practices are critical components of livestock management (Shah et al., 2015a) and the efficiency and cost of animal husbandry is affected by its feeding behavior (Khaskheli et al., 2020). Grasses are the main food for small ruminants, which are obtained by grazing (Otaru and Iyiola-Tunji, 2014). However, the amount needed to express the genetic potential for production is not attainable depending on grazing (Otaru and Iyiola-Tunji, 2014). The intake of herbage also associated with constraints such as pasture biomass, quantities and spatial distribution of pasture components as well as environmental features associated with climate, disease and sheep behavior (Otaru and Iyiola-Tunji, 2014). for example, grazing time decreases and there is limited availability of biomass in the uncultivated lands and less waste lands are available after sowing of wheat during the lean period, especially during winter (Shah et al., 2015a). In Chakwal district of Pakistan, processed feed using is limited to large ruminants. Large herds of small ruminants depend mainly on grazing, shrubs and tree cutting, while medium and small herders provide some forage, dry stems and concentrate as a feed supplement to their herds (Shah et al., 2015a). Forage production and feeding practices along with seasonal patterns are critical components of livestock management in Bahawalpur - Pakistan where feeding systems have also varied with that of small ruminant production. The feeding systems were mainly dependent on the irrigation source (canal or rainfed) in the irrigated and semi-desert areas, the highest rainfall occurs mainly during the summer season. Hence, availability of weeds in desert/semi-desert grasslands was highest during spring and summer, while remaining grasses

or dry shrubs were available in other seasons. Mixed crop livestock framing for farming families was beneficial along with the stable system. The great shepherds, who had no land, used an essentially nomadic production system (Shah et al., 2015b).

Market: As a consequence of the seasonal breeding pattern of small ruminants, it results in a stable gestation and lambing/ kidding period, which results in a seasonal pattern of milk production, which in turn leads to a seasonal pattern of meat and milk prices (Abecia, 2019). The lowest milk and meat prices can be found from late spring to early autumn (when meat/milk supply is highest) and vice versa, so, in order to obtain some of the advantages of higher winter prices, mating and lambing may be conducted "out of season", which leads to produce milk and meat for winter markets (Abecia, 2019). In most cases, insufficient milk even for newborn to adequate feeding practices was a limiting factor in milk production (Shah et al., 2015b). Although milk production was one of the important criteria for breed selection and livestock rearing in the Chakwal district of Pakistan, small ruminants are mainly kept for meat production there and very few farmers milk their animals as it is only intended for internal consumption (Shah et al., 2015a). In Bahawalpur district of Pakistan, the milking of small ruminants for commercial purposes was minimal and the milk was mainly used for raising children and the sale of animals for meat was the main output of this type of farming in the region (Shah et al., 2015b). In Lebanon, the majority of extensive producers (76%) prefer to transform the milk to traditional local cheeses and to sell the dairy product directly to the clients (Hosri et al., 2016). The diameter of the fibers, the coefficient of variation of the diameter of the fibers, the comfort factor, the softness of the bending of the fibers, the length of the staple, the stapling strength, and the production of clean wool are the main characteristics of wool production (Al-Amiri et al., 2021). In the Bahawalpur and Chakwal regions of Pakistan, wool production was not an important economic activity, and sheep were shearing twice a year, in early spring and in autumn, mostly by the farmers themselves (Shah et al., 2015a; Shah et al., 2015b). It was similar in Lebanon, where the wool produced from Awassi sheep is not valued there (Hosri et al., 2016).

Labor and Gender involvement: According to Agri-ProFocus (2014), the work often takes place in the less valuable parts of the value chain. Commonly, the manual, technological, and administrative tasks spread either between the farmer and his family, or the farm family and hired help, whether in the form of a more traditional farm worker or entrepreneur (Nye, 2018). Aspects of the role of men and women in value chains are particularly complex because market-oriented smallholder farming continues to depend on farming households and family labor (UNCTAD, 2013). Although women play an essential role in agriculture and agro-food value chains, value chain interventions usually do not include a gender perspective (Lentink et al., 2016). According to Kyotos et al. (2022), the importance of women in smallholder livestock farming must be established as a targeted political imperative and as part of a broader food security strategy. Zahra et al. (2014) confirmed that gender inequality impedes progress of vertical relationships along the sheep and goat value chain. The contribution of women lies in the production of small ruminants by performing a number of tasks, such as milking, cleaning, shade animals, forage harvesting and other dairy related activities (Zahra et al., 2014) which have lower wages (Agri-ProFocus, 2014). Shah et al. (2015a) and Shah et al. (2015b) reported that gender participation in small ruminants' production in Pakistan, which was common in case of household level farming or in case when the herd was back at the farm or the home. In Niger and Burkina Faso, women provided important labor inputs, especially in operations close to home, like nutrition. The participation of both genders at the level of production in general can be considered flexible, as the two genders participate in preparing the fodder and giving it to the animals and assisting them in giving birth. As for the purchase of fodder and contacting the veterinarian, it was the man's share, in addition to the slaughter operations (CNFA, 2016). Women in India play a major role in the management of small ruminants, especially goats. They get to absorb some of the income which leads to savings (Chakraborty and Gupta, 2017). Housewives and girls in northeast of Syria are highly involved in many activities along the value chain, from raising animals to manufacturing dairy products (Care and IMMAP, 2018).

5.3. Marketing

Marketing system is an important part of the small ruminant value chain (Shah et al., 2015b), where the investments in production and agriculture can only be profitable with an appropriate marketing system (Shah et al., 2015a). Final markets play an important role in determining the quality, quantities, prices and timing of a product's success and thus have their own role in the value chain structure (Kumar and Rajeev, 2016). For example, if shepherds cannot sell their animals in time, the animal will generally lose value (due to age, fat, content, and end of ceremonies) and it will cost more to breed it than exceed the optimum moment for sale herds (Alary et al., 2009). According to Hussen et al. (2013), marketing includes all of the activities necessary to move a product from

producer to consumer. For example, sheep marketing includes the collection, transportation and distribution of animals to end users (Dugma et al., 2012).

Although in developing countries the marketing of small ruminants is generally very random and highly variable (Devendra, 2005), an effective marketing system enhances production and an effective production system attracts marketing agents which helps to create competition links and successful marketing, which is one of the purposes of improved value chains (Shah et al., 2015b).In addition to availability of free access, transparency, homogeneity and atomization in market demand and supply which allows the provision of the product at a lower cost than the product to the consumer (Alary et al., 2009). Many studies of marketing in small ruminant value chain dealt with marketing infrastructure (especially live animal market), market information, in addition to price mechanism.

Markets Infrastructure: When studying the marketing infrastructure in Chakwal and Bahawalpur districts in Pakistan by Shah et al., 2015a and Shah et al., 2015b, it was found that small ruminants in Chakwal are traded mainly at the village level from producers through personal contact with buyers. There are organized livestock markets at the country level which are administered by the municipality without any fees for buying and selling animals in the market. In general, although transportation services are readily available, these markets lack basic facilities such as borders, electricity, loading and unloading facilities, animal watering, animal shelter and weighing scales(Shah et al., 2015a). While the municipal administration in the Bahawalpur district has set up a live animal market which is organized on a weekly basis, allowing the buying and selling of live small ruminants. The municipal administration and the Livestock Division are responsible for providing veterinary services and keeping a record of the flow of animals to and from the market during market hours. And the market lacks places for watering animals, and places for proper loading and unloading. However, the market had good road access (Shah et al., 2015b). When studying the structure of the market in the countries of the Maghreb, it turns out that livestock markets are numerous in each country of the Maghreb, and they are open to all with a modest income tax. These markets are open to patrons even if they do not have animals to sell. Most transactions on live animals or red meat are accomplished through many intermediaries with small businesses. Traders who buy animals from herders are generally themselves small herders who want to supplement their income or want to rebuild their herds (Alary et al., 2009).

Transportation: Transportation increases marketing transaction costs and creates efficiencies in the value chain (Katiku et al., 2013), where poor transportation combined with poor road conditions lead to fatigue and animal suffering (Shah et al., 2015a). Transport is a major problem in the marketing of small ruminants in Kenya (Katiku et al., 2013). In Pakistani Chakwal, external buyers use trucks depending on the distances and number of animals purchased. Domestic buyers, especially butchers, mainly use auto rickshaws, vans, or local transportation. Buyers suffer due to poor infrastructure in the markets and transportation to the next destination on the same day without any rest or proper watering and feeding of the animal (Shah et al., 2015a). It was almost the same in Bahawalpur district where the influx from local areas was coming by small vehicles while transportation to other cities was enabled by pickup trucks depending on the number of animals and travel distance. Local transportation fees depend on the distance traveled and the number of animals. The purchased animals were then transported to the target sites without any feeding or watering (Shah et al., 20015b).

Market Information and Price Mechanism: Despite the importance of market information, which is important for trading activities in prices and demand/supply for improving the efficiency of agricultural markets (Nigussie and Hoagn, 2017), farmers and Beoparies (animal collector) in general have information on trade and price situations in different markets (Shah et al., 2015a). In general, Beoparies and traders are more aware of price, demand and supply status based on their experience and information sharing through personal contacts than farmers. However, the aggregate supply and demand situation is influenced by the influx of external traders (Shah et al., 2015b; Hosri et al., 2016). Also in the Moroccan market, information about prices was known to everyone according to the shepherds (Alary et al., 2009). In Horro district in Ethiopia the main traits influencing price negotiation were coat color, body condition, tail type, body size, etc. (Duguma et al., 2012). The price mechanism in Chakwal district in Pakistan is mainly based on negotiation and bargaining at the village and market level. At the village level, the producer/seller calculates the base price based on his experience and on price information from the sales proceeds at the village level. It is also determined based on the traits and characteristics of the animals, including age, sex, breed, and season along with any compelling need for the sellers' cash needs or method of payment. Buyers mainly consider the quantity of mutton production and use the weight of the animal as one of the main factors in determining the price. Another important aspect of determining the price is the quality of lamb, which is determined by age, gender and type of breed. The price offered by the buyers is also affected by the price of mutton in the target market where they sell

mutton. They decide based on the price of the lamb and the costs associated with it (transportation, etc.), including the profit for bringing the animals to their point of sale. In general, local Beoparies also sell animals on credit terms to merchants who frequently come to their local markets (Shah et al., 2015a). The bioparies are the main supplier to small ruminants in the live markets in the Bahawalpur district through the village level and the flow of animals from the farmers themselves has been limited. The main buyers in these markets were merchants and butchers from other cities, suppliers of the army, and commission agents (Shah et al., 2015b). Age, sex, utility of animal and festival season were the significant variables in the price determination of small ruminants during their sale in live animal markets in South India (Thangarasu et al., 2021). Here, it should be noted that efficient value chains limit the use of intermediaries in the chain (Miller and Jones, 2013).

Mapping the Marketing Channel: According to Alary et al. (2009), an understanding of the channel marketing approach is necessary to understand the limitations of farmers' market decision-making process. Where a market channel is a conceptual and practical tool that helps identify market participants, market conditions, constraints, and policy issues that may hinder or enhance chain performance as well as institutions and organizations that provide services needed by different chain actors in order to make better informed decisions (Gebregziabear, 2018).Hellin and Meijer (2006) considered that the market map is the starting point to delineate value chain and for understanding the different players or actors in product inputs, output chains and the relationships between them along with the factors that determine how well or poorly the chains operate. While Waston et al. (2015) defined marketing channel as "a group of interconnected organizations involved in the process of providing a product or service for use or consumption". According to Duguma et al. (2012), the marketing channel bridges the gap between production and consumption where only a small part of goods and services are consumed at the point of production, and a small part of any output is purchased by the final consumers directly from the final producers. For small ruminants, animal marketing begins with the process of collecting animals from production areas to final markets where many different actors are involved before the animals reach the end users (Duguma et al., 2012). And so, the number and type of market participants varies across market channels (Duguma et al., 2012). In Maghreb, the sheep marketing channel was rather short with only two or three intermediaries between the farmers and the end buyers which provided good price information. A rise in sheep meat prices was observed there and this rise was explained by various factors: production is not much elastic and depends mainly on climatic factors; natural protection of national markets due to the preference of live and local lambs for festivities; and import control (Alary et al., 2009). In southern Kenya, there were primary markets, secondary markets, tertiary markets, and peripheral markets in marketing channels. Tthe primary markets were mainly at the grass-roots level while the final markets were mainly in the major urban centres. And in cases where the channel was fully functional, the selling price of animals at any point in the channel was dependent on the purchase price of the animals in the particular market in which they are being sold and the type of animal (Katiku et al., 2013). Marketing in Pakistan's Chakwal district begins with the producers, who are mostly small in size but large in number, representing the competitive market from the supply side. Village Beopari is the main player at this stage in terms of transaction volume followed by small scale purchases from farms to farms and then negligible direct purchases by butchers from neighbouring towns and cities. In live animal markets, direct marketing to farmers was relatively small. In addition to farmers, commission agents, local and outsides butchers, and suppliers, animals are also purchased at these markets. Commission agents purchase animals on behalf of major dealers, butchers, and suppliers. City butchers also buy directly from these markets. Suppliers to the military, hotels, and other agencies buy directly from these markets. A small percentage of the animals were purchased by farmers to raise livestock. Supply from target markets is mainly directed to neighbouring cities and provinces (Shah et al., 2015a). Commercial activities in the small ruminant value chain take place at several levels in northeast of Syria, starting with the owner of the herd or animal farm, the broker plays an intermediary role in facilitating transactions from farms to livestock dealers and butchers. Livestock dealers handle a larger trade volume than brokers. Traders purchase animals from farmers directly or through a broker. Where traders make frequent short-term informal credit transactions in the range of one to two weeks. All transactions are done in cash. Mostly, livestock trade takes place in the local livestock market. The export of small ruminants is a common practice by traders in the region. Male sheep and goats are exported internally to other governorates in Syria or externally to Iraq (Care and IMMAP, 2018). Goat meat is marketed in the Algerian mountain in two markets, one for the sale of live animals only, and the other for the sale of goat meat. The live animal market is a place for commercial transactions where the selling price of animals is formed. It is rare to find regular consumers who go directly to goat farmers to purchase goat meat (Mouhous et al., 2021).

5.4. Processing

As well having healthy production of livestock and marketing, processing is also an important step in enhancing value chain in livestock sector (Chakraborty and Gupta, 2017) where processing is one of the core functions of small ruminants' value chain (Duguma et al., 2012, Shah et al., 2015a). Goat meat is processed in Yabello District, Ethiopia mainly by hotels and restaurants (Hussen et al., 2013). In Pakistan's Chakwal, the butchers, the main actors at this stage, buy animals mainly from the market and process and retail the product (Shah et al., 2015a). In Bahawalpur district of Pakistan, about 90% of supply was going outside the local level and processing was also outside the target area. The slaughter was confined to the main city markets and large cities due to the lack of demand and the high prices of lamb (Shah et al., 2015b).

In Lebanon, the main products produced from the sheep and goat sector are milk and meat. 56% of extensive producers in the targeted areas of Lebanon sell their meat products in their own butchery to customers directly. Dairy products are also manufactured and marketed by the farmers themselves. Intensive producers have direct access to dairy manufacturers and slaughterhouses to sell the produce. Dairy products are mainly processed at the artisanal and SME level. It occupies a special niche market mainly located in local markets with a minimum quantity sold in supermarkets and hypermarkets (Hosri et al., 2016). In the Bekaa region of Lebanon Products made from sheep and goat milk include: Yogurt, Labneh, Kishk, Halloumi Cheese, Akkawi Cheese and Baladi Cheese and there are four types of small ruminant dairies there; 1- Large SME dairies, those that sell directly to retailers, 2- Small SME dairies, they have small showrooms or use part of their home for processing and usually have greater difficulties in producing and marketing their products. 3- Cooperatives, they are considered a relatively new participant in the value chain, and despite their limited experience, they produce excellent and high-quality products, but they cannot market their products well, and finally 4- Households, who sell the additional production locally and directly to consumers (MercyCrops, 2014).

5.5. Product Distribution and Consumption

Small ruminants produce a variety of foods, and are very useful for urban and rural markets where goat and sheep meat as well as goat milk are of great value for family nutrition and rural food security (Devendra, 2005). Total edible and salable proportions of meat vary according to species, location and country as well, and this affects the relative importance and economic value of these species (Devendra, 2005).

Alary et al. (2000) looked over the main distributions of meat in the countries of the Maghreb (Algeria, Tunisia and Morocco) were distributed as follows: 15-20% of the total meat consumption was slaughtered inside the farm, and this method mainly relates to animals that cannot be marketed. Sacrifice of young animals for Eid al-Adha or a family event (marriage, birth, etc...): This method is for about half of the animals, mostly males (over 12 months old), sold within a period of one week and these animals are the most profitable. And animals slaughtered in rural or urban abattoirs, and markets by butchers to consumers, restaurants or collective groups. This distribution channel represents 30-40% of the total consumption of red meat within two channels: The first is the short channel, where the slaughter takes place in slaughterhouses near the markets for animals supplied in the market by local shepherds specialized in fattening activities. The second one: The Long Channel: This is intended for urban consumption, and animals are slaughtered in urban slaughterhouses. The animals are supplied to these slaughterhouses by wholesalers of butchery. Usually here, two mediators intervene between the shepherd and the urban butcher, the first who buys the animal from the shepherd and the second who sells it to the butchers, and sometimes the animals can be sold several times, where the young shepherds who are unable to fatten their animals in the required manner sell the animals to the large shepherds. In the Albanian mountains, as for the marketing of meat, the animals are usually slaughtered on the farm or in some cases in primitive local slaughter facilities on farms or in the butcher. For dairy production, a very large part of the milk is consumed directly and is not processed or uncontrolled. Consumers prefer to buy cheap milk directly from farmers due to tradition and low purchasing power while milk sold in the market is processed by the dairy industry where dairies collect milk from their nearest villages.

Devendra (2005) reviewed the meat and milk products that are widely used in South East Asia, which are: Meat, fresh meat and mutton; meat products, blood and offal (feet, head, testicles); Processed meat products; frozen carcasses, chilled meat, bone-in cut, boneless cuts and salted meat. Fresh milk; processed milk products (pasteurized milk, milk powder, condensed milk); yoghurt, goat butter, ice cream, cheeses and sweets. In Pakistan, in the Chakwal region, goat meat is preferred over mutton. They also consume edible offal (heart, liver, stomach, etc.) which are sold separately and at different prices. The size of the animals influences the selling price of meat. For sheep and goat skins, butchers were the main suppliers in the local markets after these skins were salted either by direct

supply or through commission agents (Shah et al., 2015a). The type of animal, the size of the skin resulting from the difference in the sex of the animal, and the quality of the skin are determinants of the selling price of skin in the Pakistani district of Bahawalpur, and the factors that negatively affect the quality of the skin are: worms / ticks, aging, and weakness of animals (Shah et al., 2015b).

5.6. Small Ruminant Value Chain Actors and Functions

The main actors in the sheep value chain in the Horo region, Ethiopia have been identified by: sheep producers (farmers), collectors, small traders, "large traders", hotels, butchers, individual consumers and export slaughterhouses (Duguma et al., 2012). The main actors in sheep/goat value chains in Pakistan's Chakwal and Bahawalpur regions were producers (herders), gatherers (bioparis), traders, butchers, and consumers (Shah et al. 2015a; Shah et al., 2015b). Nigerian small ruminant value chains involve a large number of actors many of which are vulnerable, from the production, fortification and sale of feed, to transport, trade, butchery, food preparation, meat and food retail (CNFA, 2016). The value chain for sheep and goat products in Lebanon is relatively simple (figure 3). It includes five major stakeholder groups: input suppliers; Product Processors Product Processors and Marketing Services (Hosri et al., 2016). Mouhous et al. (2021) identify the different actors in the goat meat value chain in the Algerian region of Tizi Ouzou with the breeder, livestock dealer and representative agent in the organization of the goat meat value chain, slaughterhouses, and consumers. In order to understand the interactions, links and functions provided by the different actors in the chain, the different levels and parts of the small ruminant value chain must be carefully studied, which helps in designing the best interventions for the development of the sheep and goats value chains and enhances their marketing strategies.

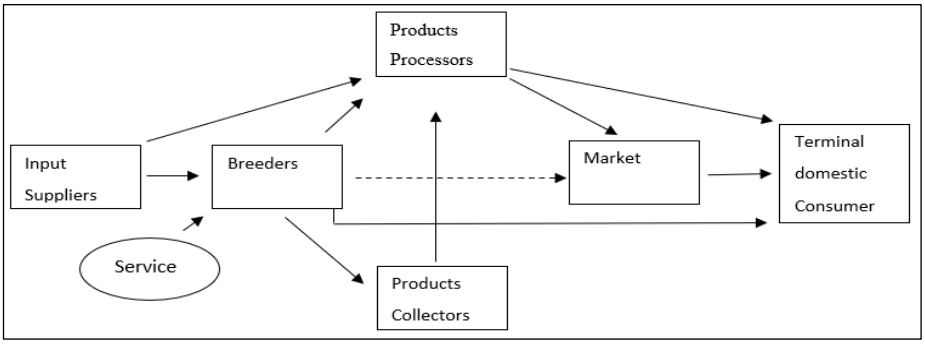

Figure 3: Goat and Sheep Value Chain in Lebanon (Hosri et al., 2016)

5.7. Value Added through Chain

According to Shah et al. (2015a), adding value at different levels of the value chain is possible only if the different components of the value chain provide synergy with each other. So, assigning added value across the chain for small ruminants is a complex problem due to product heterogeneity, such as age, sex, species and regional differences (Shah et al., 2015b). IFAD (2016) mentioned that the added value can be determined by the market and is not necessarily increased by processing or physical transformation. Conversely, CNFA (2016) assumed that value added occurs in small ruminant processing mainly in the meat and leather sector. Otherwise, the farmers and processors in Lebanon are trying to add value to the dairy products through out-of-season market access by produce artisanal cheeses with a long shelf life (Hosri et al., 2016). Mouhous et al. (2021) supposed that to add value in the value chain for small ruminants can be done by reducing the number of representatives in the chain. Reddy (2013) explicated that can occur by linking farmers to markets through effective value chains as this linkage process would reduce the use of intermediaries in the chain, and enhance value-added activities through improved technology and inputs, improved infrastructure, processing and exports. He assumed this process can increase farmers' income and will provide an incentive to improve their management practices towards higher farm productivity (Reddy, 2013). According to Mensah et al. (2017) traders in the value chain are among the actors that bring the best added value. According to Bombaj (2021), higher production costs result in lower value addition capacity at the farm level. Moreover, the small agricultural producers are not able to supply the market in sufficient quantities because their livestock and their processing capacity is very low (Bombaj, 2021).

6. Constraints and Interventions in the Small Ruminant Value Chain

6.1 Constraints at Small Ruminant Value Chain Activities

The small ruminant animal production sector faces many challenges throughout the chain. According to Belanche et al. (2021). Notable constraints facing smallholder farmers who raise sheep and goats are unsafe access to feed (crop encroachment on grazing lands, land degradation) and water and exposure to risks (drought, animal diseases, price volatility) that translate into poor productivity (ILRI et al., 2011). Table 1 summarizes of the challenges that were highlighted in related studies facing the chain at its various stages.

Table 1: Constraints at Small Ruminant Value Chain Activities

Reference	Constraints at Input Supply Stage
(Amankwah et al., 2012)	- Water shortages
(Duguma et al., 2012)	- Feed shortage
(Katiku et al., 2013).	- Inaccessibility of vaccines for immunization of small ruminant against common viral diseases
(Shah et al., 2015a)	- Feed shortage - Labor issues - Poor veterinary services
(Shah et al., 2015b)	- Poor veterinary services - Low awareness - Poor management and health care (vaccination deworming etc.) - Labor issues - Non- availability of quality breeds - Feed shortages due to seasonality - Low financial powers of small ruminant farmers
(CNFA, 2016)	- Inadequacy of vaccination and veterinary services coverage, - Uneven technical quality of auxiliary care - Limited ability by auxiliaries to develop a network of producers - Large seasonal increases in fodder prices - High cost of feeds
(Gebregziabhear, 2018)	- Lack of improvement breed in order to improve the productivity of local breeds - Shortage of feed in quantity and quality - Lake of knowledge of improved sheep farming practices - Limited access to credit
(Alhammd, 2020)	- Shortage of feed production - Imported the feed which is very expensive for farmers
(Desalegn, 2020)	- Shortage of improved breed - High cost of inputs like feeds and vet drug - Low genetic potential, shortage of feed in quality and quantity, disease, lack of technology
(EU-GAIA, 2020)	- Lack of professional domestic animal husbandry necessary - Lack of good shepherds
(Ilukor et al., 2020)	- Poor quality pastures - Poor breeds of goats
(Belanche et al., 2021)	- Lower agricultural incomes/difficulty access to capital - Low promotion of local breeds - Low consumer education - Low consumer knowledge about agriculture
(Awad el al., 2023a)	- Shortage of inputs

Reference	Constraints at Input Supply Stage
	- Lack of acess of credits
(Awad el al., 2023b)	- Shortage of inputs - Lack of acess of credits
	Major Production Constraints
(Amankwah et al., 2012)	- Theft
(Duguma et al., 2012)	- Poor traditional housing, - High incidence of liver fluke lice infestation - Lack of training on improved sheep production and management
(Shah et al., 2015a)	- High diseases prevalence - Poor housing and management - Lack of knowledge of good practice
(Shah et al., 2015b)	- Traditional knowledge and practices of management and input use - Epidemics of infectious diseases and High prevalence of diseases and parasites in small ruminants - Subsistence base livestock holding and lack of commercial orientation by the livestock holders - Costly treatment for severe illness - Lack of knowledge on hygienic, sanitary practices and proper housing of small ruminants
(CNFA, 2016)	- Difficulty collecting milk from goats - Conflicts over traditional access for migrating herds to pasture and water points - Agricultural expansion to reduce access to areas available for grazing and water points. - Conflict resulting from feeding on farm crops, so the possibility of conflict - The growing appearance of unpalatable plants on pastures, making existing pastures less productive - Animal theft
(Chakraborty and Gupta, 2017)	- The commercial goat farming is not encouraged - Low level of prophylaxis, lack of vaccines and lower accessibility to veterinary - Lack of knowledge. to identify pure breed animals
(Ilukor et al., 2020)	-Rise of parasites and diseases
(Belanche et al., 2021)	- Poor business management training - Low professionalism - Slow adaptation of innovation - Low adaptability of highly productive breeds - Lower youth participation - Heavy dependence on subsidies
(Alhammad, 2022)	- Low animals' health management accepted milking hygiene management - Bad control storage conditions of feed - Inappropriate waste management system
(EU-GAIA, 2020)	- Poor management of agricultural, animal and feeding practices - The threat of animal - Disease outbreaks - Poor management of pastures
	Marketing constraints
(Alary et al., 2009)	- Price variability due to the prevailing climatic conditions that are unpredictable
(Duguma et al., 2012).	- Transportation problems - Low bargaining power of producers

Reference	Constraints at Input Supply Stage
	- Limited access to market information - Animal theft and gaps in the law to penalize the criminals - Shortage of consistent supply of quality sheep and multiple taxation - Lack of vertical linkage of sheep producers with other actors in the value chain - Weak horizontal linkage among sheep farmers - Seasonality of demand for sheep
(Katiku et al., 2013)	- The outbreak of notifiable diseases such as CCPP - Reduction of the hygiene standards - Low retail price of small ruminants' meat - Competition for customers from colleagues
(Shah et al., 2015b)	- Lack of market experience, linkages and information limit direct market access - Transport problem and time constraint for direct marketing - The modern supply chain actors and exporters not promoting vertical linkages with farmers - Unfair competition of local butchers with traders coming from other provinces due to fix mutton prices
(CNFA, 2016)	- Intermediaries not trusted - Poor infrastructure - High interest payments by butchers and their dependence on traders for credit - Insufficient value addition and markets and poor-quality products
(Gebregziabhear, 2018)	- Lack of market information - Price decided by the traders. - Seasonality of supply and demand - High taxes
(USAID, 2018)	- Meat processing (in most cases directed to export markets) are operating well below their installed capacity; - Poor management of the livestock market; -Price distortions by market brokers mainly middlemen; -Weak culture of cooperation between development actors with market intermediaries; -Weak links with livestock marketing intermediaries.
(Desalegn, 2020)	- Price setting problem - Brokers interferences - Illegal traders
(Belanche et al. 2021)	- Meat and Dairy prices are uncertain - Volatile commodity prices
(Mofo, 2021)	- Synthetic fibers and cotton competition
	Processing constraints
(Katiku et al., 2013)	- The issue of middlemen and brokers in the marketing mix of small ruminants' animals - High overhead costs
(Shah et al., 2015b)	- Limited local level processing for mutton and products (wool) - Export slaughterhouses away from production area
(Chakraborty and Gupta, 2017)	- Abattoirs or slaughter houses are old and lack proper flooring, ventilation, and water supply. - Poor hygiene standards, posing threats to public health and environment. - The waste from slaughterhouse is also not disposed as per guidelines
(Gebregziabhear, 2018)	-Insufficient supply of sheep with poor quality

Reference	Constraints at Input Supply Stage
(Desalegn, 2020)	- Shortage of transportation from rural to market place. - Operation of abattoirs below their capacity - Limited knowledge on quality and price
	Institutional constraints
(Amankwah et al., 2012)	- Poor interaction between community, county and national water supply organizations - Weak organizational structure for animal health delivery - Researchers do not address the real problems
(Gebregziabhear, 2018)	- Lack of veterinary services

6.2. Potential interventions at Small Ruminants Value Chain Activities

According to Katiku et al. (2013), constraints at small ruminants' value chain can be resolved through the development of appropriate breeding guidelines targeting specific products for specific marketing niches. Tay et al. (2014) postulated that although behavioral change is a slow process to turn goat production and marketing into profitable enterprises, a profitable small ruminant value chain can only be reached by changing the behaviors, practices, and capabilities of the actors in the chain.

Table 2 provides a number of the interventions that were highlighted in related studies to solve constraints facing small ruminants value chain at its various stages.

Table 2: Potential interventions at Small Ruminants Value Chain Activities

Reference	Potential interventions at Input Supply Stage
(CNFA, 2016)	- Support efforts of producers' organizations to attract private veterinarians - Support fodder entrepreneurships in diverse ways, including feed banks for fattening purposes. Business training for women and women groups for selling enriched feeds from cereal residues.
(Desalegn, 2018)	- Develop the feed supply system in more commercial way with better incentives provision - Promote expansion and enhance production efficiency of feed mills - Feed suppliers quality feed production capacity and distribution system development with business model refinement and facilitation of investment expansion - Encourage improved sheep and goat breed suppliers - Support sheep breed improvement initiatives - Enhance public animal health service delivery, better service incentive and accountability development - Work with financial service providers to refine products for fattening (loan and insurance)
(Desalegn, 2020)	- High demand for improved breed, feed and vet drug
	Potential interventions at Production Stage
(CNFA, 2016)	- Form producers into economic groups. - Training courses, development of auxiliary networks and peer support - Connect with input traders and auxiliaries through group contracts to reduce prices. - Explore willingness of innovative traders for credit for feeds and connect through contracts, starting small and using social links to enforce no side-sales policies. - Collaborate with nutrition projects, promoting hygiene
(Desalegn, 2018)	- Enhancement practical extension service development - Working with model farmers for better management practice demonstration and developing fattening simple guide - Address skill gaps in technical and business management for target groups
	Potential interventions at Marketing Stage
(CNFA, 2016)	- Develop market co-management that involves all value chain actor groups, including producers. - Support through trainings, development of procedures, and study visits.

Reference	Potential interventions at Input Supply Stage
	- Support development of vertical linkages between selected traders and producer groups. - Assist with contracts and training. - Develop a strategy on the basis of potential. - Fairs for small ruminants. - Synchronized fattening combined with producer-trader contracts. - Support development of associations of intermediaries and collectors and their contacts with traders - Support studies in market renovation. - Support in finance access for equipment and market development.
(Desalegn, 2018)	- Developing live animal marketing system, market centers and infrastructure like auctions that will contribute for the transparency of the market, facilitate the creation of a grading system and improve pricing signals for both producers and traders
(Desalegn, 2020)	- Government investment on infrastructure development good market demand of the product - Enabling policy environment & support for export market
	Potential interventions at Processing Stage
(Katiku et al., 2013)	-Improve infrastructure -Increased access to market information - Regular disease control practices
(CNFA, 2016)	- Technical training courses for butchers and their apprentices. - Butcher revolving funds for improved credit management and flexibility. - Butcher improved association management for fund management. - Set up mentoring for butchers in business management - Work with collectors' association to develop mechanisms for value capturing

7. Environmental and Refugee Issues

Environmental issues are particularly important in the small ruminant value chain, given the dependence on open grazing and the feeding of bulk feed material (CNFA, 2016). The scarcity and unpredictability of precipitation, coupled with long droughts and these factors which are considered serious lead to a shortage of forage which has a negative impact on the production of small ruminants (Shah et al., 2015b). Climate change seriously affects the availability of pastures during the period of frequent droughts in production functions (Sejien et al., 2013) and severe climatic changes will impose various stresses on animals which will negatively affect their production and reproduction (Sahoo et al., 2013). In Niger, two important environmental constraints are the lack of availability of forage in the pastures and the insufficient number of water points where rainfall has been declining every year recently, which has affected a shortage of purchased compound feed and frequent diseases (CNFA, 2016). Drought-resistant and nutritious species of trees, shrubs and herbs live in the entire territory of the Cholistan rangelands. This plant species grows slowly, but responds quickly to favorable climatic conditions, and most species have an amazing potential for regeneration even with little rainfall. Several annual and transient species appear after rainfall and complete their life cycle in a short period and dry out after seed production (Shah et al., 2015b).

The presence of refugees increases competition with host communities for resources and has negative economic, social and environmental impacts, such as higher food and commodity prices, increased food insecurity, lower local wage rates, and increased environmental degradation due to high pressure on biomass to meet energy and construction needs, as well as limited livelihood opportunities, among others (Ilukor et al., 2020). Reports in the Bekaa region of Lebanon indicated that the ratio of semi-extensive to semi-intensive production is changing rapidly as a result of the Syrian refugee crisis and the decline in winter rainfall (MercyCorps, 2014). According to the World Bank report, the influx of Syrian refugees to Jordan had a direct negative impact on the management of natural resources, especially groundwater locations, and the livestock sector and the overall agricultural production there were identified as being the most affected by climate change on rain-fed agriculture and on arid and semi-arid pastures.In his study, Braam

(2022) attributed the outbreak of animal diseases in Jordan to the Syrian refugee crisis in Jordan, including the smuggling of uncontrolled livestock across the border by displaced livestock keepers. In addition to the adoption of many of the displaced Syrians by raising livestock as a means of livelihood for those who do not have the experience, the work of the displaced people with small livestock holdings that are not subject to health control as seasonal workers for Jordanian livestock breeders, and the non-inclusion of non-Jordanian owners in veterinary services provided by Jordanian government institutions. Awad et al. (2023a) also corroborated that presence of the Syrian refugees in the North-Eastern Badia of Jordan engendered an elevation in feed prices and land rents, alongside a decline in livestock prices within the live animal market, falling below their authentic market values. Notwithstanding these detrimental consequences arising from the refugees' presence, the researchers also verified the positive impact on the labor force availability associated with the presence of these refugees.

8. Sustainability of Small Ruminants Value Chain

Profit is the driving force for the continuous sustainability of all stakeholders in the continuous update of the value chain (Reddy, 2013). The value chain of the small ruminants cannot be saved, unless they are able to maintain their economic and social impact, especially in a sensitive environment with a complex environmental balance (Hosri et al., 2016). Because of the harsh conditions of sheep and goat breeders, smallholders seek resilience through diversification of their livelihood sources, low-input investment in small ruminant production, and maintaining their animals as a capital stock and insurance (Amankwah et al., 2012). Barua and Rahman (2021) concluded that implementing goats value chain sustainability in Bangladesh contributes significantly to solving the societal problem by transferring or alleviating poverty from one dimension to another. Whereas, raising small ruminants is a coping mechanism when the family is in need of cash. Small ruminants are also important for feeding productive families, through the milk they produce (CNFA, 2016). According to Zanoli (2021), chain sustainability can be achieved by building a vulnerability-resistant value chain for sheep and goats by focusing on the right knowledge, which enables the detection, understanding and tolerance of changes affecting the supply chain; Real-time adaptation, in order to seize opportunities for positive change; Based on the network approach . (Zanoli, 2021) Clarified the importance of giving priority to small ruminants research the importance of innovation (in products, processes and marketing). Innovation can help answer strategic issues: rewarding ecosystem services, better compliance with agro-ecological principles, and improving market access for sheep and goat products (Zanoli, 2021). (Miller and Jones, 2013) mentioned the most important innovations of the chain of important value-added projects in the agricultural sector that support chain financing are: preparing models for entering the market such as contract farming; Evaluate relationships using a range of analysis techniques; e.g. value-added chain mentors, interconnections, responsible authority relations and chain governance monitoring; Establishment of commodity management companies with continuous service support options to ensure implementation, security, quality and facilitate financing; Establishment of a commodity exchange with rapid knowledge of prices and trading opportunities in order to facilitate trading activities, manage risks and opportunities to use new financing instruments; Encouraging industrial competition through industrial associations, each headed by one of its members, and developing strategies for market assessment and development, promotion tools, identification of varieties, product life cycle, and differentiation between products.

CONCLUSION AND RECOMMENDATIONS

Value chain analysis aims to identify constraints and opportunities for value chain development. An improved value chain for small ruminants could help the government reduce poverty and achieve development goals. This chain can function efficiently if the constraints limiting its development are taken into account. From the foregoing, we conclude that strategies for good breeding, improving health care, providing credit, improving markets, improving pasture productivity and rehabilitating them, in addition to the involvement of potential actors and the coordinated efforts of all stakeholders; It will increase the productivity of small ruminants and improve product/market development and thus have sustainable value chains for small ruminants.

Recommendations in previous research to improve and ensure the stability and effectiveness of small ruminant value chains include:

1- The farming communities themselves with the support of public agricultural universities and the private sector should have a leadership role in determining appropriate levels of investment in value chains

2- Establishing marketing groups or cooperatives and establishing effective marketing systems that enhance the farmers' ability to supply their animals directly to consumers in existing or emerging stimulating niche markets, which can have an important role in solving the seasonal problem of product availability, which in turn will improve the process of rural development

3- Establishing links between goat farmers, processors and exporters and raising awareness of farmers about market demand for livestock is essential to help achieve a better price in the local market and produce healthy pure breed goats for export

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