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Livestock marketing and supply chain management and its impact on society

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Abstract

Livestock marketing and supply chain management play a crucial role in ensuring food security, farmer income, and socio-economic stability. This study examines livestock marketing systems and supply chain dynamics during 2021-2025 at Krishi Vigyan Kendra (KVK), Delhi, with a focus on dairy, poultry, and small ruminant sectors. The research evaluates market structures, supply chain efficiency, value addition, and societal impacts including income generation, employment, and nutritional security. Findings reveal that improved market linkages, digital platforms, and KVK-led interventions enhanced supply chain efficiency and farmer profitability. However, challenges such as price fluctuations, middlemen dominance, and inadequate cold chain infrastructure persist. The study highlights the need for integrated supply chain models, policy support, and farmer awareness to strengthen livestock-based livelihoods.

Keywords: Livestock marketing, supply chain management, KVK Delhi, dairy sector, poultry, rural development

1. Introduction

Livestock forms a crucial part of India's agricultural economy, playing a big role in the country's GDP and providing jobs. It's important to have good marketing and supply chain systems to make sure farmers get fair prices and consumers get quality products. India is the top producer of milk globally, with an annual growth rate of about 4% (Singh et. al., 2012) ^[7]. Improving productivity in dairy animals can be done through proper management, feeding, and handling (Singh et. al., 2013) ^[8]. The number of goats in our country has increased from 47.14 million in 1951 to 124.5 million by 2005 (Singh and Sharma, 2013a) ^[9]. Enhancements can be made through proper care, feeding, handling, and other environmental factors, which influence animal traits but are limited by their genetic makeup (Singh et. al., 2013b) ^[10]. Goats are an important part of livestock production and have a significant socio-economic role in the lives of the rural poor (Singh and Sharma, 2014) ^[11]. Various government and non-government organizations have recognized the value of poultry farming as a source of employment and encourage more people to start this business (Singh et. al., 2014a) ^[12]. Goats are vital in Asian agriculture, especially for people living in poor and difficult conditions (Singh et. al., 2014b) ^[13]. The world has about 921 million goats, with more than 90% living in developing countries (Singh et. al., 2014c) ^[14].

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[15]. Most people in India depend on agriculture, including goat keeping, for their daily lives, which is a key business for small farmers and landless laborers (Singh et. al., 2014g) [16]. Reproductive management of animals is based on factors like age at first breeding, first calving, and gestation length (Singh et. al., 2014h) [17]. Goat milk has less lactose than cow's milk, so it's less likely to trigger lactose intolerance (Singh and Sharma, 2015) [18]. It has played a big role in the development of human society worldwide (Singh and Sharma, 2015a) [19]. Farmers prefer *Deda* over *Kona* because it produces more biomass (Singh and Sharma, 2015b) [20]. A key point here is the awareness of risks among poor farmers and their efforts to minimize them (Singh and Sharma, 2016) [21]. India has a large and diverse goat population (Singh and Sharma, 2016a) [22]. The nutritional value of milk depends on its composition, which is affected by breed, diet, lactation stage, and season (Singh and Sharma, 2016b) [23]. Livestock production is a major part of Indian agriculture, contributing 7% to the national GDP and providing work and income to 70% of the rural population (Singh et. al., 2017) [24]. Animals in intensive systems consume a lot of protein and other nitrogen-based nutrients (Singh et. al., 2017a) [25]. Small ruminants like goats have a big impact on the economy and food supply in subtropical and tropical countries (Singh and Sharma, 2017b) [26]. Non-cattle milk makes up about 15% of global milk consumption (Singh et. al., 2025d) [43, 56]. Asia contributes about 59% of the world's goat milk production (Singh et. al., 2018) [29]. *Jamnapari* is a goat breed from the Indian subcontinent. Since 1953, they've been brought to Indonesia, where they are known as *Etawa* goats and mixed with local breeds like "PE" to create *Peranakan Etawa* (Singh et. al., 2025c) [42]. The breed's name comes from rivers in India and Bangladesh (Singh et al. 2025) [40]. There is a lot of variation in coat color, but the typical color is white with small tan patches on the head and neck (Singh et. al., 2024e) [38]. The breed has a highly convex nose line with a hair tuft that gives it a parrot-like appearance (Singh et. al., 2017c) [27]. Domestication has changed the physical traits of wild goats, leading to many different breeds (Singh et. al., 2024d) [38]. These breeds spread around the world as people migrated due to climate and resources (Singh and Sharma, 2017d) [28]. There's a big chicken industry that provides eggs and meat (Singh, G. 2019) [30]. Bacterial toxins can damage milk-secreting tissues and ducts in the udder, sometimes causing permanent damage (Singh et. al., 2024c) [38]. Severe cases can be deadly, and even if cows recover, they might face issues during and after lactation (Singh and Singh, 2020) [32]. Livestock is now a key part of efforts to reduce rural poverty and improve food and nutrition security (Singh et. al., 2025a) [40]. Dairy farmers who raise cattle and buffaloes are not well-informed about scientific management methods (Singh and Somvanshi, 2020a) [33]. India has a large and growing share of the world's livestock population (Singh et. al., 2025b) [41]. Buffaloes are mostly found in poor countries where there's a high density of both people and livestock and limited feed resources (Singh et. al., 2024b) [37]. In tropical and subtropical areas, dairy cattle typically rely only on local or introduced pastures for their nutrition. During certain times of the year, like winter or the dry season, the available forage is either not enough or poor in quality, making it hard for the animals to get enough

nutrients (Singh, G., 2019a) [31]. Goats are thought to be the first ruminant to be domesticated. Among all domesticated animals, except dogs, they have the largest range of habitats (Singh et. al., 2024a) [36]. Goats originally came from Asia and have spread to every continent, living in almost all climate zones, from the Arctic Circle to the equator (Singh, G., 2024) [35]. Goat milk is packed with essential proteins, vitamins, and minerals (Singh et. al., 2023) [34]. Because of its high nutritional value and health benefits, goat milk is widely consumed (Singh et. al., 2024f) [39]. Good management, nutrition strategies, and breeding methods can help overcome these difficulties (Singh et. al., 2025e) [44]. Goat farming is a key part of livestock in India, helping support rural livelihoods and dairy production (Singh et. al., 2025ar) [83]. The majority of India's population depends on agriculture for daily life, and goat keeping is an important part of the rural business for small and landless farmers (Singh et al., 2025as) [84]. The results of training programs given by experts at Krishi Vigyan Kendra, evaluated by young students, are called evaluations (Singh et al., 2025at) [85]. The term "Agriculture" comes from two Latin words: "ager" or "agri" meaning soil and "cultura" meaning cultivation (Singh, et., al. 2025g) [46]. Milk from mastitis has a composition similar to blood (Singh and Rodricks 2025) [47]. Feed makes up about 60 percent of the cost of producing milk (Singh and Rodricks 2025a) [48]. Nutrient needs are usually listed separately for each function, or sometimes as an overall figure (Singh and Rodricks 2025b) [49]. The poultry industry has become a highly organized and scientific field, greatly contributing to global food supply (Singh, G. 2025q) [51]. The poultry sector in India is one of the fastest-growing in agriculture, playing a big role in food security, jobs, and economic growth (Singh, G. 2025p) [57]. Livestock nutrition relies on different types of feeds and fodders, which can be sorted based on their makeup, how well they're digested, and how useful they are (Singh, G. (2025o). Nutritional needs in animals are key to animal husbandry, directly affecting growth, reproduction, milk production, and overall health (Singh, G. 2025n) [55]. These animals are found in Salem, Erode, Karur, Namakkal, and parts of Dharmapuri districts in Tamil Nadu (Singh, G. 2025m) [54]. These are also called Delhi, Kundi, and Kali (Singh, G. 2025l) [53]. Cattle farming is a vital part of Indian agriculture, providing milk, meat, animal power, and fertilizer (Singh, G. 2025k) [53]. This breed is also known as Desan, Gujarati, Kathiawari, Sorthi, and Surati (Singh, G. 2025j) [52]. Goats are the top milk producers globally (Singh, G. 2025i) [51]. Many farmers in India depend on animal husbandry for their income (Singh, G. 2025h) [50]. Mixed farming is a practice that combines growing crops with raising animals or other activities like fishing, tree farming, or poultry (Singh and Mishra 2025r) [58]. Fishing plays a huge role in India's economy, supporting many livelihoods, helping with food security, and bringing in foreign money (Singh, G. 2025s) [59]. Fish production is important for global food security, jobs, and economic progress (Singh, G. 2025t) [59]. A person working with animals should have a good understanding of the different parts of an animal's body (Singh, G. 2025u) [60]. The weight of farm animals can be estimated without using a scale (Singh, G. 2025v) [61]. When working with animals, such as milking or treating them, it's important to handle them carefully (Singh, G.

2025w)^[62]. If a farmer has only a few animals, they can be recognized based on their looks (Singh, G. 2025x)^[63]. Ageing means figuring out how old an animal is (Singh, G. 2025y)^[64]. Livestock feeds are categorized based on the specific nutrients they provide (Singh, G. 2025z)^[65]. Remove mucus from the nose and mouth and clean it (Singh G. and Garg 2025aa)^[66]. Goats are multi-purpose animals often kept for their meat (chevon) (Singh and Shakya 2025ab)^[67]. Incubation, hatching, and brooding are key stages in raising poultry, affecting how well chicks develop from fertilized eggs (Singh and Singh 2025ac)^[68]. Agriculture has been the foundation of India's economy for centuries, supporting a large part of the population (Singh and Mishra 2025ad)^[69]. Livelihood refers to the ways people get the essentials of life, like food, water, shelter, and income (Singh and Mishra 2025ae)^[70]. Various indicators help assess how sustainable, stable, and diverse a livelihood system is (Singh and Mishra 2025af)^[71]. A farming system is a set of connected parts that work together for sustainable agriculture and rural livelihoods (Singh and Mishra 2025ag)^[72]. Livestock farming is a key part of the livelihood for many people, especially in rural areas (Singh 2025ah)^[73]. Agroforestry combines trees, crops, and livestock on the same land to boost productivity and ecological balance (Singh and Mishra 2025ai)^[74]. Integrated aquaculture is a sustainable system that mixes fish farming with livestock or crops to use resources better and increase output (Singh G., 2025aj)^[75]. Integrated farming combines different agricultural activities like crops, livestock, poultry, fishing, tree farming, and added products to use resources more efficiently and raise farm income (Singh and Mishra 2025ak)^[76]. Agricultural productivity and sustainability depend a lot on the climate and weather conditions. The suitability of farming methods changes based on regions, influenced by soil type, rainfall, temperatures, and available resources (Singh and Mishra 2025al)^[77]. Commercial farming is a major factor in economic growth, rural development, and job creation in India (Singh, G. 2025am)^[78]. Farming-based livelihood systems in India are varied and include different types of activities like growing crops, raising dairy animals, keeping poultry, fishing, planting trees along with crops, and creating products from agricultural goods (Singh and Mishra 2025an)^[79]. Government initiatives and programs are important in helping farmers and improving their livelihoods through farming (Singh and Kumar 2025ao)^[80]. Opportunities related to farming-based livelihoods are key for the economic and social growth of rural areas (Singh, G. 2025ap)^[81]. In the 21st century, farming-based livelihoods are changing due to new global trends such as the circular economy, green economy, adapting to climate change, using digital technology, and shifting consumer choices (Singh, G. 2025aq)^[82]. Livestock products such as milk, meat, and eggs require efficient handling, storage, and transportation due to their perishable nature. Poor supply chain management often leads to economic losses and reduced product quality. Krishi Vigyan Kendras (KVKs) serve as knowledge and extension centers that bridge the gap between research and farmers. During 2021-2025, KVK Delhi has played a key role in strengthening livestock marketing through training, demonstrations, and digital initiatives.

Materials and Methods

Study Area

The study was conducted at KVK Delhi, covering peri-urban livestock farms, dairy cooperatives, poultry units, and local markets.

Study Period

2021-2025

Data Collection

- Structured interviews with farmers, traders, and consumers
- KVK training and extension records
- Market surveys and price analysis
- Secondary data from government reports

Analytical Techniques

- Supply chain mapping
- Cost-benefit analysis
- Trend analysis of prices and demand
- Descriptive statistical tools

Results and Discussion

Livestock Marketing Systems in Delhi Region

The livestock marketing system includes:

- Direct sales (farm-to-consumer)
- Cooperative marketing (milk unions)
- Private traders and intermediaries
- Digital platforms (online dairy delivery, poultry apps)

Milk marketing is relatively organized compared to meat and poultry sectors.

Supply Chain Structure

Typical supply chain:

Producer → Collector → Processor → Distributor → Retailer → Consumer

Key features

- Milk supply chains are more structured with cold storage
- Meat supply chains are less organized and lack hygiene standards
- Poultry supply chains are semi-organized with contract farming

Role of KVK Delhi in Supply Chain Improvement

KVK Delhi has implemented:

- Training programs on value addition (paneer, curd, ghee)
- Awareness on hygienic handling and packaging
- Promotion of farmer producer organizations (FPOs)
- Digital literacy programs for online marketing
- Demonstration of cold chain and storage techniques

Impact on Society

Economic Impact

- Increased farmer income through direct marketing
- Reduced dependency on middlemen
- Growth of small-scale livestock enterprises

Employment Generation

- Job creation in processing, transport, and retail sectors
- Opportunities for youth and women in dairy entrepreneurship

Nutritional Security

- Improved availability of milk, eggs, and meat
- Enhanced dietary protein intake among urban and rural populations

Social Empowerment

- Women participation in dairy cooperatives increased
- Strengthened rural-urban linkages

Challenges in Livestock Marketing

1. **Price Fluctuation:** Seasonal demand affects farmer income
2. **Middlemen Dominance:** Farmers receive lower share of consumer price
3. **Lack of Infrastructure:** Poor cold storage and transportation
4. **Perishability:** High post-harvest losses
5. **Limited Market Information:** Farmers lack real-time pricing data

Emerging Trends (2021-2025)

- Growth of e-commerce platforms for milk and meat delivery
- Increased adoption of digital payments and mobile apps
- Expansion of organized retail chains
- Rising demand for organic and hygienic livestock products
- Development of cold chain logistics

Case Observations from KVK Delhi

- Farmers adopting direct-to-consumer milk delivery reported 20-30% higher profits
- Value-added products like paneer and flavored milk increased income
- Poultry farmers linked to contract farming showed stable earnings

Conclusion

Livestock marketing and supply chain management in the KVK Delhi region have significantly improved during 2021-2025 due to institutional support, digitalization, and farmer awareness programs. These advancements have positively impacted income, employment, and nutritional security. However, persistent challenges such as inadequate infrastructure and market inefficiencies require targeted interventions.

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