Economic Analysis of Mutton Production and Trade in Kashmir

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(MSAE-12-2019)

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Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir

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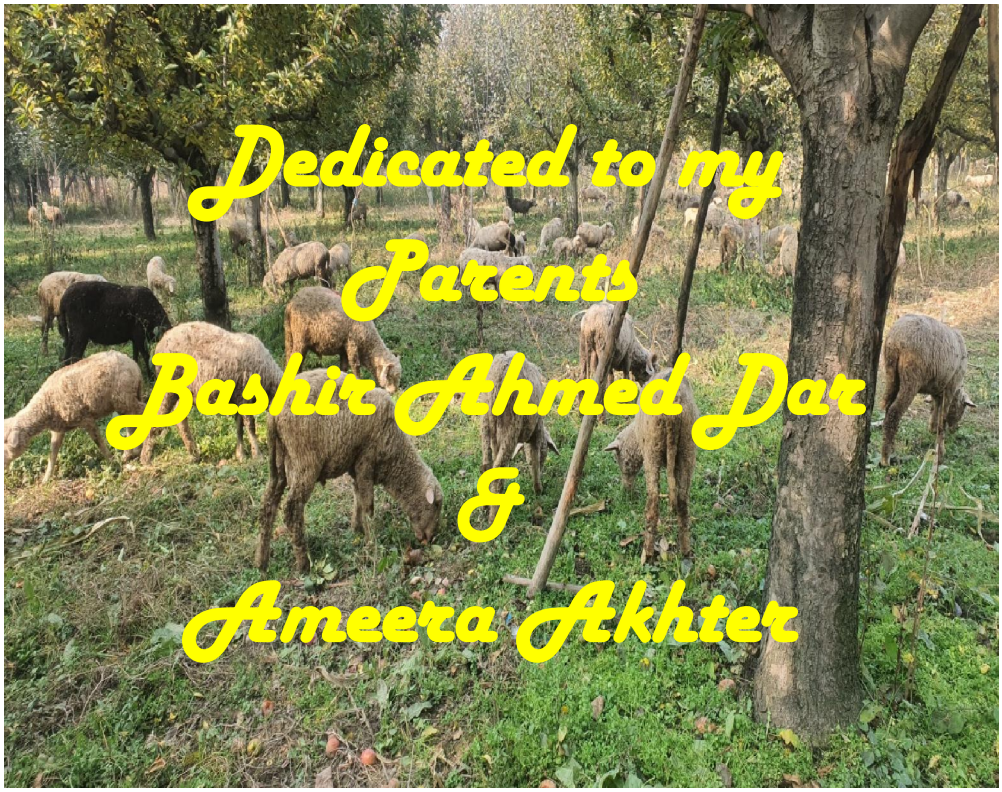
Dedicated to my
Parents
Bashir Ahmed Dar
&
Ameera Akhter

Sher-e-Kashmir
University of Agricultural Sciences &Technology of Kashmir,
Faculty of Horticulture, School of Agricultural Economics and Horti-Business Management

Certificate – I

This is to certify that the thesis entitled, **"Economic analysis of mutton production and trade in Kashmir"** submitted in partial fulfilment of the requirements for the award of the degree of **Master of Science in Agriculture (Agricultural Economics)**, to the **Faculty of Horticulture, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir** is a record of bonafide research work carried out by **Mr. Athar Bashir (Regd. No. MSAE-12-2019)** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

It is further certified that information received during the course of investigation has duly been acknowledged.

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Certificate – II

We, the members of the Advisory Committee of **Mr. Athar Bashir (Regd. No. MSAE-12-2019)**, a candidate for the degree of **Master of Science in Agriculture (Agricultural Economics)** have gone through the manuscript of the thesis entitled, **"Economic analysis of mutton production and trade in Kashmir"** and recommend that it may be submitted by the student in partial fulfilment of the requirements for the award of the degree.

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Certificate – III

This is to certify that the thesis entitled, **"Economic analysis of mutton production and trade in Kashmir"** submitted by **Mr. Athar Bashir (Regd. No. MSAE-12-2019)** to the **Faculty of Horticulture, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir** in partial fulfilment of the requirements for the award of the degree of **Master of Science in Agriculture (Agricultural Economics)** was examined and approved by the Advisory Committee and External Examiner on …….

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ABSTRACT

To analyse the production efficiency of small ruminants (sheep and goat) under two management systems (extensive and semi-intensive rearing), a study was undertaken in Kashmir covering the districts of Anantnag, Srinagar and Baramulla as representative areas. The primary data was collected from 80 sheep/goat rearers (40 under each management system), 26 mutton sellers/ butchers and 14 *kotdhars* (importers cum wholesalers) were also selected. The data was examined through tabular analysis besides using stochastic frontier for estimating efficiencies. Findings of the study revealed that, in case of extensive rearing system, average economic efficiency (0.90) and allocative efficiency (1.28), were higher as compared to semi-intensive rearing system, while as technical efficiency was higher in semi-intensive system (0.86). The net returns per animal was less (₹3,796) in extensive rearing and high (₹5,683,) in semi-intensive rearing. While as, the total cost per animal was realized to be ₹3850 in case of extensive rearing and ₹7591 in case of semi-intensive rearing. Majority of farmers (65%) opted for channel-I (farmer—butcher—consumer) and rest followed channel-II (farmer—khotdhar—butcher—consumer). Analysing the demand, supply and price scenario in the study area, it was found that there is deficiency of local mutton supply in the valley, which leads to heavy importation from other states. The demand and local supply curves did not intersect at any

point as there is huge unfulfilled demand while price reveal general inflation behaviour despite the commodity regulation from the union territory of Jammu and Kashmir government. As a fact that Kashmir Valley is bestowed with the vast green pastures, there is a huge potential for the production of mutton especially through the extensive rearing for which government should formulate the concrete and tangible policies and programs to upscale the mutton production which will also address the problems of unemployment as well as enhance value output to regional economy.

Key words: mutton production, trade, demand-supply, performance efficiency, rearing system

Signature of Student

Dated: _____

Signature of Major Advisor

Dated: _____

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(Athar Bashir)

Place: Shalimar, Srinagar

Dated:

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Chapter-1

INTRODUCTION

India is the second largest populated country in the world, owning the maximum of livestock population throughout the country. The majority of the population's livelihood is dependent on agriculture both crop production as well as animal husbandry, where animal husbandry benefits the society to fulfil the food self-sufficiency and security. Livestock rearing is the second most important sub-sector in the agricultural economy next to crop production like rice which is the stable crop and grown in large scales. This sub-sector is one of the fastest growing sub-sectors in agriculture, Indian agriculture sector receives a significant foreign exchange currency from the export of animal products that plays an important role in the socio-economic life of the nation. Some of the animal products exported from India to international markets are buffalo meat, goat and sheep meat, poultry products (egg and meat), animal casings, milk and milk products. However, in international market, the Indian buffalo meat demand increased suddenly in the meat export as compared to others. The buffalo meat export dominated the exports with a contribution of over 89.08 per cent in the total animal export from India. The main markets for Indian buffalo meat and other animal products are Vietnam Social Republic, Malaysia, Egypt Arab Republic, Iraq and Saudi Arabia (APEDA, 2020). The former observation underlines many opportunities for producers and owners of animals. Ruminants contribute directly to food and nutrition security by producing precious dietary animal proteins and especially for the malnourished, by transforming vegetation from non-arable land, crop residues, by-products from food processing and other non-conventional feeds for the very poor for sustaining improved livelihoods. Ruminants also contribute indirectly to food security by increasing crop productivity through the use of dung and urine. Within the available animal genetic resources, the multifunctional value of goats throughout the developing countries provides a very important social and economic niche, especially through

the supply of meat and milk to enhance nutrition and food security. The current situation and potential future developments of sheep sector are fundamentally determined by the efficiency of production, the judgment of sheep products and the structure of production in the sector.

The contribution of goats range from supplies of precious animal proteins (meat and milk) to sustain nutrition and food security; fiber and skins; providing draught power in the highlands; socio-economic stability of farm households, survival of mankind in extreme arid condition and potential for providing a pathway for a brighter tomorrow. Since meat and milk are important products, the growth and efficiency of the production systems, orderly marketing of these products with good hygiene is essential and is determined to a very large extent by value chains and innovation. Equally important is the capacity of the livestock keepers and producers of small ruminants in the small farms. Small farmers have major problems coping with a range of difficulties in the face of prevailing very variable, complex and inefficient marketing chains in which there is variable participation. Foremost among these is access to marketing and to the marketing chain. At present, inadequate access to market outlets, weak marketing arrangements and inadequate marketing skills represent a major constraint for small farmers, the landless and the owners and producers of dairy goats in the production to consumption systems, as a consequence, small farmers are often denied participation in compelling and beneficial economic opportunities and remain unprogressive. India is the exception, since much of the credit of what little is known presently goes to the Central Leather Research Institute (CLRI) in Chennai, India. The initiative to understand the marketing of small ruminants and meat handling systems started with a very large Government of India mandated study to CLRI on Raw Hides and Skin markets and a two-phased research and development (R and D) project on Meat Handling Systems which was supported by the Canadian International Development Research Centre (IDRC) for approximately six years (1992-1997). Very useful baseline information and

experiences were generated about what is known presently concerning the status of the marketing of small ruminants, slaughter and meat handling and processing in India.

Small ruminants are raised by small, marginal and landless farmers in India, following different rearing systems. The rearing system still continues in a traditional manner in spite of numerous developmental activities for poor and landless farmers. The different rearing systems are intensive, semi-intensive and extensive for wool and meat production. Semi-intensive rearing system enhances the productive performance with less environmental stress on the animals. The system requires high investment but, the productivity is also high. In extensive rearing system the animals are allowed to graze in common grazing lands and pastures. The animals are grazed in adverse climatic conditions which will adversely affect the productivity. Neither the supplementary feed is given nor is the care at different life stages. The cost of production is less moreover the yield is also low as compared to other two systems. The major reasons for low productivity in semi-intensive and extensive rearing system are inadequate grazing resources, diseases causing high mortality, morbidity, exploitation by middle man, low adoption of improved management technologies and improper breeding management (Kochewad *et al*., 2017).

Human population of Kashmir comprises 68.8 lakh (Census of India, 2011) and with projected population for 2020 as 82.6 lakh whereas the livestock population is 74.994 lakh, out of the total with 14.582 lakh cattle (11.046 lakh cross + 3.536 lakh local), 16.261 lakh sheep (13.439 lakhs cross +2.882 lakhs local), 0.214 lakhs buffaloes, 3.172 lakhs goats, 35.496 lakhs fowls, 5.269 lakhs ducks (Census for livestock, Ministry of Fisheries, Animal husbandry and Dairying, 2019). Kashmir is blessed with vast meadows and pastures and has tremendous potential to nurture animals like sheep and goat here in the Valley, but Kashmir continues to be at the mercy of other states to meet the demand.

The people of Kashmir Valley are active meat eaters as compared to other Indian states. More than 80 per cent of the population in the Valley is non-vegetarian. Official statistics say Jammu and Kashmir annually consumes around 51, 000 tons of mutton worth 1,200 crore of which 21,000 ton is imported from outside. For every kilogram of mutton exported from other states in the form of livestock to Kashmir, expenditure of Rupees 60-70 extra per kilogram in needed for tax and transportation, which a consumer has to pay ultimately.

There have been a number of studies conducted throughout the world as well as in India on Production and Trade of Mutton. In order to know the scenario of production efficiency of sheep and goat rearing under various rearing systems, in Kashmir Valley an investigation entitled **"Economic analysis of mutton production and trade in Kashmir"** has been carried out with the following objectives:

1. To estimate the production efficiencies of mutton under various rearing systems.
2. To examine the demand, supply and price scenario of mutton trade.

Chapter -2

REVIEW OF LITERATURE

A brief review of literature is the integral part of any investigation as it not only gives an idea on the work done in the past, but also provides the interpretation and discussion of the findings. Therefore, a brief resume of the studies conducted on the theme has been discussed in the ensuing section.

Shah *et al*. (2020) studied on mutton production, demand and supply in Jammu and Kashmir. The results showed that despite having favourable environmental and geophysical conditions for sheep rearing and a huge market for meat and meat products, Jammu and Kashmir imports on an average 1,47,29,899 heads of small ruminants annually for slaughter from the deserts of Rajasthan to make up the deficit, which results in an annual loss around 40 crores. The importation of sheep and goat for slaughter presented an increasing trend over the years from 2002 Further, considering the projected human population, production, consumption behaviour and import of small ruminants (goat and sheep) in J&K, there is a deficit of 257.5 to 710.88 lakh kg. The gap between supply and demand is expected to get widened in future.

Raineri *et al*. (2015) investigated that the variable costs represented 64.15 per cent of total cost, while 21.66 per cent were represented by operational fixed costs and 14.19 per cent by the income of the factors. As for elasticities to input prices, the opportunity cost of land was the item to which production cost was more sensitive: a 1.0 per cent increase in its price would cause a 0.26 per cent increase in lamb cost. Meanwhile, the impact of increasing any technical indicator was significantly higher than the impact of rising input prices. A 1.0 per cent increase in weight at slaughter, for example, would reduce total cost in 0.91 per cent. The greatest obstacle to economic viability of sheep production under the observed conditions is low technical efficiency.

Jeelani *et al*. (2019) revealed that, mutton production in the Kashmir division indicated an increasing trend since 2002-03 with a positive slope of 1.37 lakh Kg per year (R^2=0.897). A total of about 147 lakh sheep and goat heads have been imported into the state from the year 2006-07 to year 2016-17. The meat import showed an increasing trend up to year 2012-13 and thereafter showed a decreasing trend from 2012-12 to 2016- 17. It was found that since 2006, the imported livestock consisted of about 96 per cent sheep and only 4 per cent goats. There was an increasing trend in the import of sheep and goat from 1973 to 2010.

Kumar *et al*. (2018) research had concluded that, there are many constraints for the slow growth of the Indian meat industry, including lack of scientific approach to rearing of meat animals, unorganized nature of meat production and marketing, socio-economic taboo and inadequate infrastructure facilities and poor harvest management.

In the study by Baruwa (2013) in Nigeria, it was indicated that smallholder goat enterprise was female-dominated with majority aged between 51–60 years. The multiple regression model analysis showed that management practice ($P < 0.01$), gender ($P < 0.1$), age of cost of medication ($P < 0.01$) and flock size ($P < 0.05$) significantly influence the profitability of smallholder goat production in the study area. The result of Likert's scale indicated that 66.8% of the consumers preferred goat meat to other meats because of its availability (56.8 %) and taste (22.3%). Goat production was profitable, if major constraints such as lack of access to credit facilities, disease outbreaks, mortality and poor foundation stock were addressed properly.

Kochewad, S. A. (2017) indicated that intensive system requires high investment but, the productivity is also high. The semi-intensive system allows the sheep for grazing as well as intensive rearing will result in economic production. In extensive sheep rearing system the animals are allowed to graze in common grazing lands and pastures. The animals are grazed in adverse climatic

conditions which will adversely affect the productivity. No supplementary feed is given as well as care of different life stages is not proper

Mahmoud (2010) studied the status of the world goat population and their productivity. The total number of goat and sheep were 861.9 and 1078.2 million, respectively. The largest number of goats was observed in Asia, followed by Africa, representing about 59.7 per cent and 33.8 per cent, summing up to 93.5 per cent of total world livestock population. The study exhibited that total number of goat population in world were 590 million during 1990 with average growth rate of 3.4 per cent per annum. Similarly, growth in cattle population was 5 per cent per annum and sheep decreased by 10 per cent.

Raineri *et al*. (2015) observed that the Production Cost Index for Lamb can be seen as an important tool for the market and the agribusiness network, as it has the potential to collaborate with the organization of the sector, assisting in market transparency, marking of prices and the reduction of information asymmetry. Both the model and the index prepared are sufficiently complete and dense to be replicated in other regions, under different conditions and even in other species.

Sadiq *et al.*(2003) estimated that about 70-80 per cent of the total cost was constituted by the labour cost. Fodder (green as well as dry) cost ranges from 15 per cent to 19 per cent on different farm categories. The enterprise exhibit increasing return to scale, which provide better opportunities to the area farmers for investing more in livestock sector. Animal Units, Feed and Labour are the significant positive contributors to livestock production, while Medical Cost affects the enterprise negatively.

According to Moris (2009), sheep can be found in all continents; Sheep is rich in varieties, all the products are utilizable and sheep lends itself as the raw material of valuable, sometimes luxury category goods. Sheep, as small ruminants, utilize grasslands and although they are periodically kept in stalls, their keeping is environmental-friendly. In contrast with all the positive aspects of the

sector, the number of these animal species drops worldwide, in the Asia and in India as well. Out of the four main sheep products (meat, fleece, milk and pelt), meat is the primary product in several parts of the world, especially in areas of temperate climate and the relevance of meat production grows all over the world (Morris, 2009).

Shinde and Naqvi (2015), research review indicated that dairy sheep breeds are predominately found in Middle East and Mediterranean countries. The contribution of sheep milk to total milk production in the world is negligible (only 1.32 per cent) but it is important in some of the countries like Greece, Syria, Jordon, Iraq, Somalia where sheep milk contributes 17–36 per cent of total milk production. Awassi is a well-known dairy breed belonging to fat-tailed group and widely found in Middle East (Syria, Lebanon, Jordan, Iraq and Israel) countries. Awassi has proliferated, for breeding purposes, into at least 30 countries in all continents. Other dairy sheep breeds like Assaf (Israel), East Friesian (Germany), Lacaune (France), Sarda (Sardinia), Chios (Greece), Manchega (Spain), etc. are reared under intensive system for milk production. More than 95 per cent of sheep milk is converted into cheese. Ewes 'milk is rich in proteins, minerals and lipids. Sheep milk is a medical necessity as an alternative to cow milk for many people and especially for infants. Bioactive peptides of sheep milk proteins have specific biological activities, such as antihypertensive, antimicrobial, opioid, antioxidant, immunomodulatory or mineral binding. These protein fragments are formed from the precursor inactive protein during gastrointestinal digestion and/or during food processing. Dairy sheep farming is more profitable and provides 2.2 times more net income per flock and per ewe over non-dairy sheep farming.

In the study by Shivakumara (2019) it was revealed that overall outlay required for beginning sheep farm were, in extensive rearing (₹1,74,706), semi-intensive (₹2,31,243) and in intensive rearing (₹6,33,857) respectively. With respect to goat farm, extensive rearing (₹1,33,881), semi-intensive (₹1,96,673) and in intensive rearing (₹4,61,041) respectively in Mandya and Mysuru districts

of Karnataka. The total cost per annum was relatively low in goat rearing across all the rearing methods, extensive rearing (1880/animal), semi-intensive rearing (₹2355/animal) and in intensive rearing (₹3811/animal) compared to sheep rearing, extensive rearing (2060/animal), semi-intensive rearing (₹2638/animal) and in intensive rearing (₹3874/animal).The net return per animal was higher in goat rearing across all the rearing methods, extensive rearing (₹ 1537/ animal), semi-intensive rearing (₹2174/animal) and in intensive rearing (₹4186/animal) compared to sheep rearing, extensive rearing (₹1092/animal), semi-intensive rearing (₹2020/animal) and in intensive rearing (₹ 3983/animal).

Shalander (2007) analysed the economics and prospects of commercialization of goat production in the country using primary data from 18 commercial goat farms in different states. It was revealed that several large and progressive farmers, businessman and industrialists have adopted commercial goat rearing. The entry of large farmers, who have better access to technical knowledge, resources and market, into this activity would help in realizing the potential of goat enterprise. A most of profitable goat farms have been found operating with positive net returns. Goat rearing has been found equally rewarding under both intensive and semi-intensive systems of management. Intensification and commercialization of goat rearing has been recorded important because of shrinking of resources for extensive grazing. Commercialization would help in increasing the goat productivity and bridging the demand-supply gap. However, use of improved technologies, particularly prophylaxis, superior germplasm, low-cost feeds and fodders and innovative marketing of the produce would be the pre-conditions for successful commercial goat production.

In the study by Abraham (2013), the profitability and efficiency of different sheep production systems are evaluated and discussed. The Agri Benchmark methodology with the TIPI-CAL simulation model were applied by constructing a typical farm for four different sheep production systems, namely extensive sheep production: rangeland only, semi-extensive sheep production:

rangeland supported by irrigated pastures and two intensive sheep production system using irrigated pastures and silage respectively for production. Market returns and the total live weight sold per ewe were the highest in the irrigated pasture system. Ewe productivity was the highest on the irrigated pastures and the silage system the most effective with the highest lamb growth rates. All four the sheep production systems are profitable over the long term with a positive profit margin. Management was the key word to the successes of any sheep production system and includes critical management issues in terms of fodder planning (pasture management), health management and control of effective feeding.

Kakar *et al.* (2013) studied production patterns of sheep and goats in district Qila Abdullah, Balochistan. The findings of the study revealed that the average capital cost on animal was ₹450, while feeding cost was ₹3,079, medication and vaccination charges was ₹ 26, labour charge was ₹ 135, marketing charges was ₹ 16 and miscellaneous charges was ₹9 and accumulated overall per animal recurring cost was ₹3,264.65 per animal per year. Producers received gross revenue of ₹5,252 from the sale of animals, manure and wool against an expenditure of ₹3,824. The overall net returns worked out to be ₹1,428 per animal per annum. The farmer earned ₹1.38 (1:1.38) on one rupee investment. Breakdown of consumer's rupee revealed that producer shared 68 paisa from consumer's rupee and pocketed 0.38 against the cost of one rupee.

Eihab *et al.* (2014) conducted study in three regions of United Arab Emirates (UAE), in this area the sheep and goat are reared under scarce natural resource conditions. The cross-sectional data was collected from the 661 mixed farms. Few of the tools they used are Cobb-Douglas, stochastic frontier production function and maximum likelihood estimation was used to estimate the important economic derivatives and some risk factors associated with the production. It was found that sheep rearing was good, compared to goat rearing in UAE. The most important factors are flock size and breed type compared to other

factors and they reveal that they have constructive relation with technical efficiency. Finally experience and good practices also have significant to rearing.

Wijethunga *et al*. (2015) carried out the study in Bulathkohupitiya veterinary range, their main objective was to identify the prospects and constraints to improve the economic productivity of goat herds. The data was collected from 82 sample farmers, the goats where reared under two different management systems, namely intensive and extensive rearing system. The analysis of data was done by using the software SAS. The outcomes from the data revealed almost all farmers in the area considered goat rearing as a part time business. When compared to both systems, the average herd size of extensive management systems was significantly greater than intensive systems. With respect to the birth weight, slaughter weight and growth rate under intensive management system were significantly greater compared to extensive system. The average monthly profit was significantly lower under intensive management system compared to extensive management system because of high costs in feeding and labour involvement in intensive system. Therefore, it can be concluded that goat rearing under extensive management system was more profitable compared to intensive management system in Bulathkohupitiya Veterinary Range.

Arun and Dhaka (2005) worked out the productivity of goat markets in the central alluvial plains of West Bengal. The consequences of the study identified five marketing channels have been found in marketing of male goat in the study area. The major marketing cost components have been found as assembling, maintenance, animal preparation, labour and transportation for sellers, market fee, labour and levy for buyers. Broker have not involved in goat marketing. The gross market margin has been found lowest in the Farmer – Farmer channel and this channel has turned out to be most efficient. The study also reported that as the number of intermediaries involved between producer and ultimate buyer increased, the producer's share in consumer rupee decreased.

Aggelopoulos *et al.* (2009) studied the potential of reformation and boosting the business growth of sheep farms, by reducing their production costs. They collected the primary data from 110 Greek sheep farms and through the method of principal component analysis, the present study examines the "internal cohesion" of the factors that shape the overall production costs, while analyzing the structural relations between their primary parameters. It is concluded that all efforts to reduce production costs should aim at: a) a productive use and rational utilization of the fixed capital, b) a decrease of production costs for animal food, c) a productive valorization of family labour. The latter (as a cost component) presents a discriminating capacity for all sheep farms. It is therefore clear that a reduction in wages is a necessity for all such farms. A full valorization of family labour, and an increase in level of mechanization per employee, is expected to lead to a reduction in the former's cost of use.

From the above discussion it could be seen that although lot of study has been done at national and international levels, however no comprehensive study has been conducted in the Valley of Jammu and Kashmir relating to the economic analysis of mutton production and trade, especially the estimation of production efficiencies under various rearing systems. This study will be done to examine the overall economic analysis of production and trade of mutton in Kashmir Valley.

Chapter -3

MATERIAL AND METHODS

The consistency, exactitude and validity of the research finding of any scientific enquiry are based upon the selection of appropriate material method and analytical tool. This chapter shows the overall description of the study area, methods of data collection and sources, method of data analysis and analytical tools used in the study.

3.1 Description of the Study Area

The study was carried out in Anantnag, Srinagar and Baramulla districts of Jammu and Kashmir Union Territory. Anantnag lies on the southern part of the Valley, Srinagar in the center and Baramulla in the northern part of the Valley. Geographically, the region is located between 33.270 latitude and 76.250 longitude, which covers an area of 34,953 hectares. Kashmir is a separate geographical entity and one of the regions of Jammu & Kashmir union territory which is separated by the Himalayan Mountain ranges from the Jammu region with the population of approximately 8,260,885 in 2020. The region has an area of 15,948 km^2 (out of 42,241 km^2 area of J & K union territory). The total area of Kashmir valley rural and urban areas is 15,226.4 Km^2 and 721.54 Km^2 respectively. Kashmir region have three broad divisions and ten districts.

3.2 Method of Data collection

Both primary data and secondary data have been used for this study. The study focuses on the whole Kashmir valley by dividing the sheep and goat rearers in to two categories namely; semi-intensive and extensive rearing system. Semi-intensive (partially out door rearing system) is a type of rearing system in which the livestock is fed both indoor as well as outdoor and is most preferred rearing practice in the study area. Lastly, extensive (outdoor rearing system) is the type of rearing system by which the livestock is completely kept outside for rearing. This is commonly found amongst nomadic tribes. For this study the primary data

was collected through a comprehensive household survey in the above-mentioned category under which the sheep and goat rearers were selected from each category for the year 2021. The sheep and goat rearers were selected through a purposive random sampling technique. The total sample consisted of 120 sample sizes in which 80 samples from sheep and goat rearers (40 each category), 40 mutton dealers/Kotdhars and Local sellers/ Butchers. The survey was conducted through questionnaire, framed in such way as to draw out details covering household characteristics, income level, sheep and goat rearers characteristics, institutional and access related variables, risk and economic factors to estimate the profitability of mutton production in the study areas. The secondary data were obtained from Directorate of Agriculture, Government of India, Ministry of Fisheries, Animal Husbandry and dairying, Livestock census and other written documents such as thesis, journals and reports.

3.3 Analytical tools

Sheep and goat rearers were categorized according to their sizes with semi-intensive and extensive rearing system. Descriptive statistics such as percentages, mean, frequency distribution and tabulation were used to calculate the socio-economic and sheep and goat rearers' characteristics of the respondents.

The data collected was specified in the empirical model as given below:

Empirical modeling

$$Yi = A+\sum a_j x_{ij} + (V_i-U_i)$$

The Stochastic Frontier Analysis (SFA) method was used in modeling the technical, allocative and economic efficiency of sheep and goat farmers. In the stochastic frontier model, the output is assumed to be bound by a stochastic production function.

Deviation (v_i - u_i) comprises two parts:

1. Symmetric component that allows random diversity of the frontier among observations and captures the effect of measurement error, random shock and so on and

2. One-sided component of deviation which captures the effect of inefficiency. This model was introduced by (Aigner *et al.*, 1977), (Meeusen and Broeck 1977) and later developed and by Schmidt (1979)

Stochastic frontier production function model applied to estimate the technical efficiency at the rearing farm level is mathematically described as follows:

$$Y_i^* = f(X_i;\beta) + \varepsilon_{ii}=1, 2. n$$

Where Y_i is the output, X_i denotes the actual input variables, which included quantity of dry fodder, quantity of green fodder, quantity of concentrates, number of man days and number of doses. β is a parameter of the production function which value is not yet known and ε is the error term that consists of two components, namely:

$$\varepsilon_i = V_i - U_{i3}$$

The first error component, the error term V_i is symmetrical and assumed to be identical, independent and normally distributed N (0, σ2v). While the second is the error term U_i, which is independent to the V_i and normally distributed N (0, σ2u). This error term allows actual production function to be under the frontier production function. According to Jondrow in Ogundari and Ojo (2006) and (Pakage *et al.*, 2015) estimation of technical efficiency is shown by the average inefficiency distribution (U_i) with certain ε value; the inefficiency formula is written as follows:

$$E= (Ui/ \varepsilon_i) = \frac{\sigma_u\sigma_v [\, f(\varepsilon_j \lambda / \sigma - \varepsilon_i \lambda] 4}{\sigma\ 1\text{-}F\ (\varepsilon_i \lambda / \sigma)\ \sigma}$$

Where $\lambda = \sigma_u / \sigma_v$ and $\sigma 2 = \sigma 2u + \sigma 2v$, while f and F each indicates standard normal density and cumulative distribution function calculated from $\varepsilon_i \lambda / \sigma$.

Technical efficiency in farming is defined as the actual output condition (Y_i) to Frontier output (Y_i *) by using the available technology, which is derived from equation (3) mentioned above in order to obtain:

$$TE = Y_i/Y_i^* = [E(Y_i|U_i, X_i)/E(Y_i|U_i = 0X_i)]$$

$$= E[\exp(-U_i)/\varepsilon_i]$$

TE value lies in the interval of 0 to 1 or $0 \leq TE \leq 1$ and if TE = 1, the farming is in an efficient condition.

Frontier stochastic cost function model used to estimate the economic efficiency at the farmers level is described as follows:

$$Ci = g(Y_i, X_i; \alpha) + \varepsilon_{ii} = 1, 2, \ldots n$$

Where Ci is the total production cost, X_i denotes the actual input costs, α is the parameter of the function costs and ε is the error term that consists of two components, namely:

$$\varepsilon_i = V_i + U_i,$$

Here the first error component, error term V_i, is a symmetric error term and assumed to be identical, independent and normally distributed N (0, σ^2 v). While the second is the error term U_i, which is independent to the V_i and normally distributed N (0, σ2u). Economic efficiency can be estimated using the following equation:

$$EE = \frac{C^* + E(C_i/U_i=0, Y_i, P_i) = E[\exp.(U_i)/\varepsilon]8}{C\ E(C_i/U_i, Y_i, P_i)}$$

The efficiency value of the equation for the cost function is referred to as the economic efficiency (EEI) at each observation i. C * is the cost under ideal conditions or conditions in which efficiency is achieved (Full Efficient), while C is the actual cost based on observations. The balance between costs under ideal conditions (C *) and the actual cost based on observations (C) will determine the

inefficiency coefficient. There is no inefficiency effect ($U_i = 0$) in the observation unit if $C_i^* = C_i$.. Such condition indicates that the costs required are relatively low, with index of economic efficiency value on the observation i equals to 1 or $EE_i = 1$. If Ci * $<C_i$, inefficiency ($U_i > 0$) and index EEI> 1. Economic efficiency value is between 0 and 1.

Frontier version 4.1c computer program has the capacity to estimate the cost efficiency (CE) in which the result is the opposite to economic efficiency (EE) (Coelli *et al* 1998) or, in other words, the economic efficiency (EE) is the opposite of cost efficiency (CE). Thus, according (Ogundari and Ojo 2007), economic efficiency (EE) at the farmer level can be estimated using the following equation:

$$EE = 1/CE$$

Economic efficiency is the result of the technical efficiency (TE) multiplied by allocative efficiency (AE) at each observation. Equation economic efficiency is as follows:

$$EEi = TEi \times AEi$$

If the value of technical efficiency (TE) and the value of economic efficiency (EE) are known, the amount of allocative efficiency (AE) can also be determined. The value of allocative efficiency (AE) is not necessarily less than one or equals to one or $0 < AE < 1$. Thus, the value of allocative efficiency (AE) is obtained using the following equation:

$$AE = EE/TE$$

Chapter-4

EXPERIMENTAL FINDINGS

The findings of the study and the results of the investigation are discussed in the present chapter with the main focus on some of the causes responsible for important results under the following headings in consonance with the objectives of the study.

4.1 Socio-economic characteristics of sheep and goat rearing farmers

4.1.1 Characteristics of sample farmers

4.2 Growth trend in sheep and goat population

4.3 Categorization of sheep and goat rearing farmers

4.3.1 Composition of sheep herd and goat flock size for extensive and semi-intensive rearers

4.3.2 Possession of shed by semi-intensive and extensive rearers.

4.3.3 Identification of marketing channels

4.4 Capital requirement in sheep and goat rearing

4.4.1 Cost and returns of sheep and goat rearing under different rearing methods

4.5 Efficiency of sheep and goat rearing

4.5.1 Technical efficiency of semi-intensive and extensive rearing systems.

4.5.2 Economic efficiency of semi-intensive and extensive rearing systems.

4.5.3 Allocative efficiency of semi-intensive and extensive rearing systems.

4.5.4 Economic efficiency of semi-intensive and extensive rearing systems

4.6 Demand, supply and price scenario of mutton trade

4.6.1 Present status of demand and supply.

4.6.2 Time series analysis of demand and supply of mutton over the years.

4.1 Socio-economic characteristics of sample farmers

4.1.1 Characteristics of sample farmers

The general characteristics of the sample farmers (Table 1) revealed that most of farmers are between the age group of 41-50 years in extensive rearing (60 %) and in semi-intensive rearing (42.5 %). It is important to note that, in general majority of extensive and farmers are illiterates (90 %) while in case of semi-intensive rearing (60%) are illiterate. and (30%) have completed the high school.It was found that majority of semi-intensive (75 %) rearing farmers were having medium (4-6 members) family size followed by large (>6 members) family size. But with respect to the extensive (60 %) rearing farmers the majority were (4-6 members). On an average in extensive the family size is around 7 and in semi-intensive around 6 members in household. With respect to land holding, in both methods of rearing regimes extensive rearing (92.5%) and semi-intensive rearing (47.5%) the majority of the farmers are small farmers (<5 kanal), followed by medium farmers (5-10 kanal) extensive rearing (7.5 %) and semi-intensive (40%) and farmers having the land more than 10 kanals was found only in semi-intensive rearing farmers (12.5 %). The average size of land holding in these methods of rearing was found as 1.9 kanal in extensive and 6.3 kanal in semi-intensive re aring method. In general socio-economic characteristics of the sample farmers indicated that most of the sheep and goat rearing farmers are in the age group of 40 years and above. And majority of them are illiterates in extensive and semi-intensive. With respect to extensive rearers they are rearing the animals over the

period of years, from their ancestor's they get the animals as their assets and continue their profession with the rearing, most of the sampled farmers are illiterate because they live in remote villages, far flung areas and because of family constraints they were not affording to join the school. Similarly, majority of the sheep and goat rearing households have medium family size of 4-6 members and majority of them are small land holders (< 5 kanal). This might be due to profitability of enterprise which attracted rural uneducated medium size family of small and marginal farmers to engage in sheep and goat rearing activity to lead their sustainable livelihood.

Table 1: Socio-economic characteristics of respondents (in %)

	Extensive rearing farmers (40)	**Semi-intensive rearing farmers (40)**
I. Age Group (No.)		
a. Below 40 years	10 (25%)	**15 (37.5%)**
b. Between 41-50 years	24 (60%)	**17 (42.5%)**
c. Between 51-60 years	6 (15%)	**8 (20%)**
Average age (years)	**42 years**	**38 years**
II. Education Level (No.)		
A. Illiterate	36 (90%)	**24 (60%)**
B. High School	3 (7.5%)	**12 (30%)**
C. College and above	1 (2.5%)	**4 (10%)**
III. Family Size (No.)		
a. Small (<4 members)	2 (5%)	**0**
b. Medium (4-6 members)	24 (60%)	**30 (75%)**
c. Large (>6 members)	14 (35%)	**10(25%)**
Average family size	**7**	**6**
IV. Land Holding (No.)		
a. Small farmers (< 5 Kanal)	37 (92.5%)	**19 (47.5%)**
b. Medium farmers (5- 10kanal)	3 (7.5%)	**16 (40%)**
c. Large farmers (> 10kanal)	0	**5 (12.5%)**
Average land holding (inkanal)	**1.9**	**6.3**
V. Total respondents (n)	**40**	**40**

4.2 Growth trend in sheep and goat population

4.2.1 Trend in sheep and goat population

Trend in sheep and goat population in Anantnag Baramulla and Srinagar district, Kashmir valley and Country as a whole was worked out in the livestock census 2019 is represented in Table 1.1

In Anantnag district, population of sheep was estimated 10,860 numbers in 2019, with a mixed trend across the livestock census. The Baramulla district having 41,068 sheep and Srinagar having 2,146 sheep in 2019. Similarly, sheep population in Kashmir was estimated to be 20,76,034. However, country as a whole, according to livestock census, sheep population was estimated to 74.26 million in 2019.

In case of goat, the population was estimated to 2,56,160 goats in 2019 with a mixed trend of percentage change over the period of years in Anantnag district. While Baramulla was having 1,93,631 goats in 2019 and in Srinagar number of goats was estimated to be 1,64,095. Similarly, goat population was estimated to be 34,43,115 in 2019 in Kashmir valley according to the livestock census. As for the country as a whole, goat population was estimated to be 148.88 million in 2019.

Table 1.1: District-wise sheep and goat population of Kashmir during 2019

Sl. No.	District	Goat (No.)	% to Total	Sheep (No.)	% to Total	Total (No.)	% to Total
1	Anantnag	256160	7.44	10860	0.63	267020	5.16
2	Badgam	225377	6.55	16193	0.94	241570	4.67
3	Bandipora	72500	2.11	17224	1.00	89724	1.73
4	Baramulla	193631	5.62	41068	2.37	234699	4.54
5	Doda	132324	3.84	68161	3.94	200485	3.88
6	Ganderbal	210958	6.13	9843	0.57	220801	4.27
7	Jammu	35370	1.03	130140	7.52	165510	3.20
8	Kargil	45604	1.32	63710	3.68	109314	2.11
9	Kathua	118960	3.46	221215	12.79	340175	6.58
10	Kishtwar	82286	2.39	74472	4.30	156758	3.03
11	Kulgam	63518	1.84	3591	0.21	67109	1.30
12	Kupwara	126238	3.67	55012	3.18	181250	3.50
13	Leh Ladakh	248089	7.21	176396	10.20	424485	8.21
14	Poonch	232128	6.74	114279	6.60	346407	6.70
15	Pulwama	210371	6.11	3887	0.22	214258	4.14
16	Rajauri	163547	4.75	286076	16.53	449623	8.69
17	Ramban	189926	5.52	25937	1.50	215863	4.17
18	Reasi	235969	6.85	159556	9.22	395525	7.65
19	Samba	178613	5.19	57515	3.32	236128	4.56
20	Shopian	135040	3.92	1808	0.10	136848	2.65
21	Srinagar	164095	4.77	2146	0.12	166241	3.21
22	Udhampur	122411	3.56	191129	11.05	313540	6.06
Total		3443115	100.00	1730218	100.00	5173333	100.00

All India 20th livestock census report 2019

4.3 Categorization of sheep and goat rearing farmers

4.3.1 Composition of sheep and goat herd size under semi-intensive and Extensive rearing

The composition of sheep and goat size has been indicated in (Table 1.2) under two different management regimes. In case of sheep and goat rearing, in extensive and semi-intensive the average female sheep were 32 and 13 respectively. However, kids/lambs were 25 and 09 in extensive and semi-intensive, respectively. While number of males was 10 and 6 respectively. It is clear from the table that the composition of sheep and goat size indicated dominance of female herd amongst both the rearing types.

Table 1.2: Composition of flock size under different rearing methods (Numbers)

	Sheep/goat herd size			
	Male	**Female**	**Lamb/Kids**	**Total**
a. Extensive rearing	10	32	25	67
b. Semi-intensive rearing	6	13	9	28

Note: Decimal values are rounded to its nearer value

4.3.2 Possession of sheep and goat shed

Mutton production system in our country is predominantly extensive system with zero input concepts. Majority of sheep and goats were reared either in open yard or in semi concrete type houses without scientific standard. The possession of sheep and goat shed by the respondents is presented in Table 1.3. The study revealed that, in case of extensive farmers majority of the respondents had constructed kaccha type of house for rearing goat and sheep (100%) in extensive rearing system. Whereas in case of semi-intensive rearing farmers the majority of them had pacca type house (62.5 %) and mixed type was (25 %). The kaccha shed type house (12.5%) respectively.

Table 1.3: Possession of sheep and goat shed by sample respondents

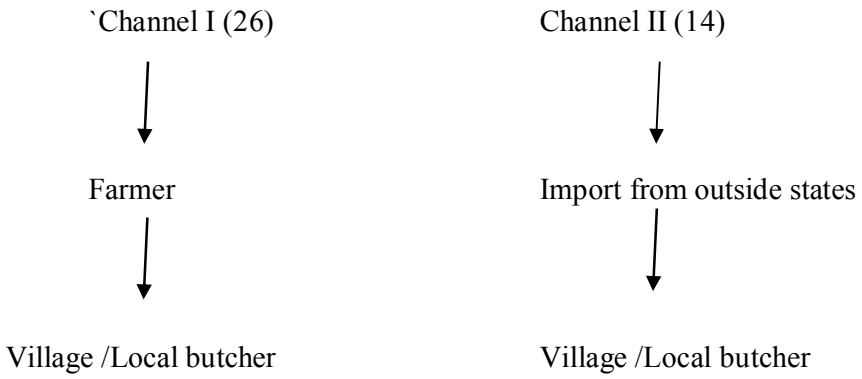
Type of shed	Extensive rearingfarmers		Semi-intensive rearing farmers	
	Number	%	Number	%
a. Kaccha	40	100	5	12.5
b. Pacca	0	0	25	62.5
c. Mixed	0	0	10	25
d. Total	**40**	**100**	**40**	**100**

It is known fact that sheep and goat production system in the country as well as in the state is predominantly extensive system in the rural area with sheep's and goats reared either in open yard or in a mixed type houses without scientific standards. The findings of the study proved that, majority of the farmers have used kaccha type of house in case of extensive rearing system. The reason might be lower annual income earning capacity of the respondents and their family members. Similar findings were reported by Braj Mohan *et al.* (2012) revealing that majority of the goats are reared either in open yard or in mixed type houses without scientific basis. A proper shelter controls the incidence of diseases, pests and enhances the productivity of the animal. While as in case of semi-intensive system of rearing the majority of farmers had pakka type of shed, which shows the better earning capacity overall, which effects the overall production thus improving returns.

4.3.3 Identification of marketing channels

Majorly there were two channels identified in the marketing of sheep and goat, these included channel I and channel II. The channel I was most preferred channel as majority of the respondents (26) adopted it while channel II was less preferred (14) as it required well established resources base and transportation setup. Moreover it was seen that channel I is well preferred as it is easy for the farmer to adopt, by directly selling his produce to village/local butcher.

Table 1.4: Channels identified for the marketing of sheep and goat



4.4 Capital requirement in sheep and goat rearing

4.4.1 Cost and returns of sheep and goat rearing under different rearing methods

Cost structure

Cost of rearing plays an important role in deciding the extent of profit. The cost structure with respect to both the types of rearing method has been presented in the Table 2. The results of the study revealed that total (maintenance) cost per animal per annum was higher in case of semi-intensive rearing system (₹2,621) and less (₹1,233) in extensive rearing system. The average weight in case of extensive rearing was less (16 kg per animal) while as in case of semi-intensive rearing it was more (26 kg per animal). The difference in average weight is due to the reason that majority of animals in extensive rearing includes goats while in case of semi-intensive, it is sheep. The body weight of sheep is heavier than the goats of same age.

In case of extensive rearing, of the total variable cost, major cost component was on cost of labour (₹1124), followed by fodder and concentrates (₹950), miscellaneous expenses (₹332) and veterinary costs (₹210). The fixed cost comprised amortized cost on shed cum store room (₹787) and cost of miscellaneous equipment (₹447). In case of semi-intensive rearing, of the total variable cost, major cost component was fodder and concentrates (₹2102),

followed by labour (₹1866), miscellaneous expenses (₹744) and veterinary care (₹258) per animal per annum. The fixed cost comprised amortized cost on shed cum store room (₹1,755) and cost of miscellaneous equipment (₹866).

Table 2: Cost and returns of small ruminants under extensive and semi-intensive rearing system (₹ per animal)

Particulars	Extensive rearing	Semi-intensive rearing
Average herd size	**67**	**28**
I. Variable cost		
a) Fodder & concentrates	950	2102
b) Labour	1124	1866
c) Medical expenses	210	258
d) Miscellaneous expenses	332	744
Total Variable Cost	2616	4970
II. Fixed cost		
e) Amortized cost of shed cum store room per animal per annum	787	1755
f) Value of misc. equipment's	447	866
Total Fixed Cost	1234	2621
III. Total cost	3850	7591
Average Weight per animal (Dressed weight) in Kg	16	26
Average weight per animal (Live Weight) in Kg	32	52
Cost of production (Live weight)	110	146
Cost of production (Dressed weight)	241	292
IV. Returns		
k) Sale of animal	7368	12589
l) Sale of Lamb/kid	110	173
n) Sale of manure	145	405
q) Sale of skin	24	61
V. Gross returns	7646	13229
VI. Net returns	3796	5638

Note: 1. Decimal values are rounded to its nearer value

4.4.2 Returns from extensive and Semi-intensive rearing.

The returns realized from sheep and goat rearing includes sale of animals, sale of lamb, manures, milk, meat, skin and penning. The per annum total returns obtained is presented in Table 2. The gross returns worked out to be higher in case of semi-intensive rearing (₹3,796), followed by extensive rearing (₹5,638) per annum. In case of semi-extensive rearing among the returns, the majority of the returns came from the sale of animals (₹12,589), followed by (₹405) manure, sale of lamb (₹173) and sale of skin (₹61) per annum. In case of extensive rearing among the returns, the majority of the returns came from the sale of animals (₹7,368), followed by manure (₹145), sale of lamb (₹110) and sale of skin (₹24) per animal per annum

Net returns obtained per animal per annum worked out to be (₹3,796) and (₹5,638) in extensive and semi-intensive rearing, respectively. It is interesting to note that, cost as well as return per animal per annum was significantly higher in semi-intensive method compared to the extensive method. This is due to the reason that there are better rearing and management practices adopted in case of semi-intensive rearing method while in case of extensive method the animals are subjected to improper management strategies and vagaries of diseases and harsh weather. Moreover in extensive rearing, the composition of goats in the herd size is higher (75%) which form low body weight as compared to sheep, with the result making lesser returns per animal from goats. On the other hand, semi-intensive system comprises exclusively of sheep in the study area.

4.5 Efficiency of sheep and goat rearing

4.5.1 Technical efficiency of extensive and semi-extensive rearing system.

Technical efficiency evaluates the farms ability to obtain the maximum possible output from a given set of resources. Technical efficiency of the sheep and goat rearing was calculated by using Stochastic Frontier analysis (SFA). SFA is a method of economic modelling. It has its starting points in the in the stochastic production frontier models simultaneously.

Table 2.1: Frontier results for semi-intensive method

Semi Intensive			
Sr. No.	**Factors**	**Coefficient**	**T ratio**
1	Intercept	0.8935	1.4668
2	Quantity of dry fodder (Qa.)	0.2713	6.0678
3	Quatity of green Fodder (Qa.)	0.2712	9.5317
4	Quantity of Concentrates	1.9346	2.3114
5	no. of man days	0.9415	1.3699
6	no. of doses	1.4226	2.0484
7	sigma-squared	0.0121	4.0621
8	Gamma	1.0000	10645.8600
9	LR test	16.37318	
10	Mean Technical efficiency	0.86	
11	Mean Cost efficiency	1.01	
12	Economic Efficiency	0.89	
13	Allocative efficiency	1.05	

The technical efficiency of goat and sheep rearing farmers under semi-intensive rearing as shown in table 2.2 was found to be 0.864 and in case of extensive rearing as shown in table 2.3 was found to be 0.745 respectively. Under extensive rearing 12.5 per cent of farmers have operated cent per cent efficiency, 20.0 per cent had 90-99 per cent efficiency level, 20.0 per cent had 80-89 per cent efficiency level, 5.0 per cent had 70-79 per cent efficiency level and 40.0 per cent had 60-69 per cent efficiency level as shown in table 2.4. Under semi- intensive rearing 5.0 per cent of farmers have operated cent per cent efficiency 45.0 per cent had 90-99 per cent efficiency level, 5.0 per cent had 80-89 per cent efficiency level, 45.0 per cent had 70-79 per cent efficiency level and 0.0 per cent had 60-69 per cent efficiency level as shown in table 2.5.

Table 2.2: Frontier results for extensive method

	Extensive		
Sr. No.	**Factors**	**Coefficient**	**t ratio**
1	Intercept	1.6036	2.2873
2	Quantity of dry fodder (Qa.)	0.5093	5.5740
3	Quantity of green Fodder (Qa.)	0.6592	8.1699
4	Quantity of Concentrates	0.0397	15.8803
5	no. of man days	0.2684	215.6638
6	no. of doses	0.4551	16.0378
7	sigma-squared	0.3015	17.3096
8	Gamma	1.000	23231830.0
9	LR test	14.913331	
10	Mean Technical efficiency	0.74	
11	Mean Cost efficiency	1.01	
12	Economic Efficiency	0.90	
13	Allocative efficiency	1.28	

It is worth to mention that, no farmers were having efficiency level below 50 per cent in both the rearing systems. The value of gamma (γ) obtained is equal to 1.00 and gives a very significant effect on the confidence level of $\alpha = 0.01$. Such value indicates that the variation of errors due to the technical efficiency is 100 per cent, or the difference between the actual production and the possibility of maximum production is triggered by the differences in the technical efficiency. Results show that the level of technical efficiency achieved per individual farmers varied. The variation is caused by the differences of managerial ability, especially in the term of setting, formulating and using factors of production to yield a number of products. The LR test values obtained from the farms is 16.672 in case of semi-intensive system and such value of the LR test is much greater than the value of $\chi 2 = 3.842$. It shows that almost all of the variations in the output of the

frontier production can be considered as the result of technical efficiency level of attainment related to the managerial matters in the management of farm. The value of technical efficiency is within the range of 0.73 to 0.99 in case of semi-intensive rearing system of which average is 0.74, while in case of extensive the range is from 0.6 to 0.99 of which the average is 0.86 The distribution of the value of the technical efficiency is shown in Table 2.4

Table 2.3: Frequency distribution of technical efficiency indices for extensive method

Efficiency Indices	Frequency (n = 40)	Per cent (%)
60-69	16	40
70-79	2	5
80-89	9	22.5
90-99	13	32.5

- Maximum 0.99
- Minimum 0.64
- Average 0.74

Table 2.4 Frequency distribution of technical efficiency indices for semi-intensive method

Efficiency Indices	Frequency (n = 40)	Per cent (%)
60-69	---	
70-79	18	45
80-89	2	5
90-99	20	50

- Maximum 0.99
- Minimum 0.73
- Average 0.86

The present results show that the level of technical efficiency achieved per individual farmers varied. The variation is caused by the differences of managerial ability, especially in the term of setting, formulating and using factors of production to yield a number of products. In case of semi-intensive system if the average farmer in the sample area were to reach the TE level of its most efficient counterpart, then the average farmer could experience a cost saving of 13.2 per cent (1- [0.86 / 0.99] x100). The same condition applies to the farmers whose technical efficiency is on the lowest level. If farmers are able to achieve the highest efficiency, they will be able to save about 26 per cent (1- [0.73 / 0.99] x100).while as in case of extensive rearing method if the average farmer in the sample area were to reach the TE level of its most efficient counterpart, then the average farmer could experience a cost saving of 25.3 per cent (1- [0.74 / 0.99] x100). The same condition applies to the farmers whose technical efficiency is on the lowest level. If farmers are able to achieve the highest efficiency, they will be able to save about 36.4 per cent (1- [0.64 / 0.99] x100).

4.5.2 Analysis of economic efficiency

The results from the analysis of economic efficiency show the inefficiency effects of the production costs. The value of gamma (g) which is 1.0 significant at 1 per cent level implies that about 100 per cent of the total production is triggered by differences in cost efficiency of the farmers as shown in table 2.1 and 2.3. The economic efficiency predicted is the opposite of the cost efficiencies of which value is varied among farmers. Table 2.6 shows the value of economic efficiency ranged from 0.870 to 0.90 of which average was 0.89 in case of semi-intensive system while table 2.7 shows that of extensive system is ranged from 0.84 to 0.90 with average of 0.90 which is higher than semi-intensive rearing system. The range of the economic efficiency value indicates that the farmers were quite efficient in using production factors by the lowest possible cost for gaining the highest possible yield of production. If an individual farmer with efficiency of average value (0.89) is able to achieve the highest possible level of economic

efficiency as the most efficient farmers do, then the farmer will able to save costs by 1.2 per cent (1- (0.89/ 0.90) x100). The same calculation applied for the most inefficient farmer economically provides data in which he/she will gain efficiency level by 3.4 per cent (1- (0.87/ 0.90) x100). Where as in case of semi-extensive rearing 10 per cent (1- [0.90 / 0.99] x100) cost saving for average farmer and 16 per cent for the lower-level farmers (1- [0.84 / 0.99] x100) respectively

Table 2.5: Frequency distribution of economic efficiency indices for semi-intensive system

Efficiency Indices	Frequency n= 40	Per cent (%)
80-90	7	17.5
90-99	33	82.5

- Maximum 0.90
- Minimum 0.87
- Average 0.89

Table 2.6: Frequency distribution of economic efficiency indices for extensive system

Efficiency Indices	Frequency (n = 40)	Per cent (%)
0.80-0.90	10	25
0.90-0.99	30	75

- Maximum 0.90
- Minimum 0.84
- Average 0.90

4.5.3 Analysis of allocative efficiency

Based on the allocative efficiency analysis results in Table 2.7 and Table 2.8, it can be seen that there is a difference among extensive and semi-intensive system. Allocative efficiency values ranged from 0.90 to 1.98 of which average is 1.28 for the semi-intensive system, while for extensive system, values ranged from 0.89 to 1.2 with average of 1.05. The value of allocative efficiency suggests

that if the average farmer in the sample is able to reach the level of allocative efficiency of the most efficient farmers, the average farmer will be able to save 35.4 per cent of costs (1- (1.28 / 1.98) x100). The same calculation applied to a farmer who is not efficient provides data in which they can save cost by 55% (1- (0.9 / 1.31) x100). Based on the distribution value of allocative efficiency that 20 per cent are in the interval from 0.90 to 0.99. The lowest value achieved allocative efficiency suggests that farmers in the study area is quite efficient in production. This shows that the farmer has efficient in minimizing the cost. Where as in case of semi-extensive rearing 47 per cent (1- [1.05 / 1.98] x100) cost saving for average farmer and 56 per cent for the lower level farmers (1- [0.89 / 1.98] x100) respectively

Table 2.7: Frequency distribution of allocative efficiency indices for semi-intensive method

Efficiency indices	Frequency (n= 40)	Per cent (%)
0.80-0.89	3	7.5
0.90-0.99	17	42.5
>1.00	20	50

- Maximum 1.2
- Minimum 0.89
- Average 1.05

Table 2.8: Frequency distribution of allocative efficiency indices for extensive method

Efficiency indices	Frequency (n = 40)	Per cent (%)
0.80-0.89	1	2.5
0.90-0.99	8	20
>1.00	31	77.5

- Maximum 1.98
- Minimum 0.90
- Average 1.28

4.6 Demand, supply and price scenario of mutton in the state

4.6.1 Present status of demand and supply.

From Table 2.9, it is obvious that there is a regular and increasing trend in the demand of the mutton in the Valley. Looking at the change in price over years the price of mutton in the valley has tremendously increased from ₹330 in the year 2012 to ₹535 in 2021 similarly, the demand of the mutton has increased from 266 lakh kg in 2012 to 310 lakh kg in 2021.Meanwhile the supply side also increased from 71 lakh kg to 114 lakh kg but due to the increased population and increased demand the dependence on local supply is too less. Although the price of the mutton is increasing continuously but there is no effect on the reduction of demand. It is supported by the fact that the majority of the population in the Valley are active meat eaters and moreover the local supply is also lagging behind to fulfill the requirements of local population and as such the entire Valley is highly dependent on the import of mutton while there is absolutely no export from the valley**.** Despite of the fact that the entire valley is full of lush green pastures, still there is insufficient production so as to fulfil the local demand.

Table 2.9: Demand supply and prices of mutton in Kashmir

Year	Demand (lakh kg)	Supply (lakh kg)	Price ₹	CPI	Adjusted Prices
2012-13	266	71	330	115.6	452
2013-14	270	80	360	123.1	463
2014-15	270	75	400	129.4	489
2015-16	275	77	420	135.2	492
2016-17	290	100	445	138.1	510
2017-18	295	110	465	139.1	529
2018-19	310	112	480	147.5	515
2019-20	310	114	535	158.3	535
2020-21	310	114	535	158.3	535

Note: prices taken from Directorate of CAPD Jammu and Kashmir (2021)

4.6.2 Time series analysis of demand and supply of mutton over the years.

The Figure 1.0 below represents the local supply and demand of mutton in Valley. It can be clearly seen that the local supply over the period of time does not meet the demand, therefore we do not see the point of equilibrium where the two could intersect although there is a regular increase in the price of mutton. It may be depicted as a sort of inelastic situation where price of the commodity is have no effect on the change in demand, in fact with the increase in price the demand is also increased.

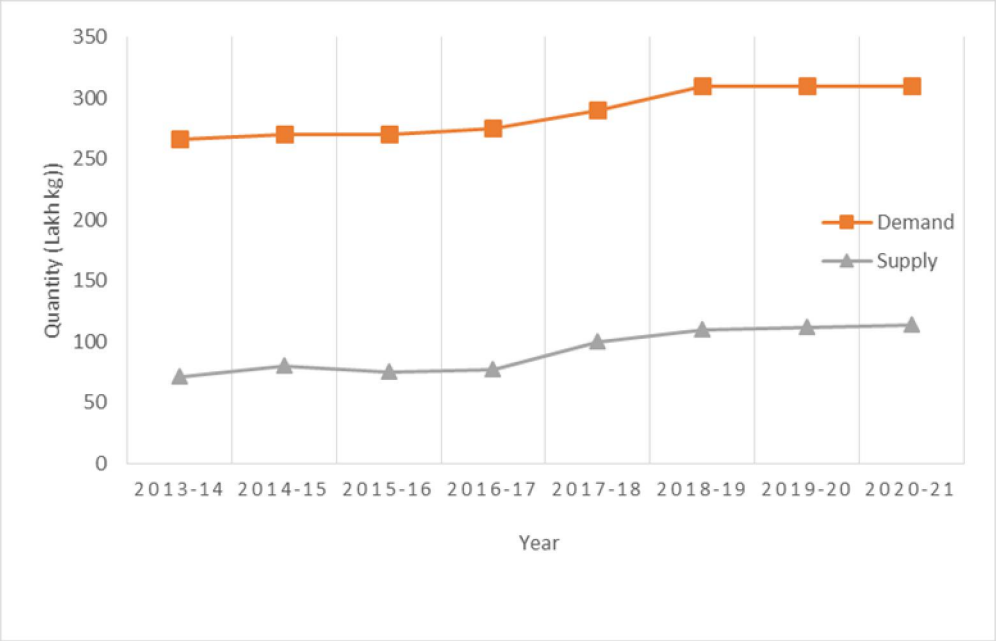


Figure 1: Time series analysis of demand and supply of mutton over the years

Chapter 5

DISCUSSION

5.1 Efficiency of sheep and goat rearing

5.1.1 Technical efficiency of extensive and semi-extensive rearing system.

Table 2.2 and table 2.3 shows the technical, allocative and economic efficiencies of the semi-intensive and extensive method respectively. The tables were obtained using the stochastic frontier analysis introduced by Van den Broeck(1977). It could be analyzed that besides technical efficiency, both allocative as well as economic efficiency were higher in extensive method as compared to the semi-intensive method.

5.1.2 Analysis of economic efficiency

Table 2.5 and table 2.6 shows the frequency distribution of economic efficiencies of extensive and semi-extensive system respectively. It was analyzed that average efficiency of extensive system was slightly higher (0.90) as compared to the semi-intensive method (0.89) with the range varying from 0.87 to 0.90 in extensive method and 0.84 to 0.90 in semi-intensive method.

5.1.3 Analysis of allocative efficiency

The distribution of allocative efficiencies is depicted in table 2.7 and 2.9 given for extensive and semi-intensive method respectively. Similar to the economic efficiency it can be seen that similar trend is followed in the allocative efficiencies, so the average economic efficiency is higher in case of extensive system (1.28) as compared to semi-intensive rearing, ranging from 0.90 to 1.98 in extensive system and 0.89 to 1.20 in semi- intensive system.

5.2 Demand, supply and price scenario of mutton in the Valley

5.2.1 Present status of demand and supply

Table 2.9 depicts the demand, supply and prices of mutton in Kashmir Valley from the year 2012 to 2021. It can be clearly seen that, there is a continuous increase in demand as well as prices as we move from past to the present time. It means that that the local supply is inadequate to suffice the demands of the population, so there is a constant increase in the import of mutton from outside Valley which simultaneously leads to the increase in price due to the various costs incurred while importing the livestock.

5.2.2 Time series analysis of demand and supply of mutton over the years

The graph represented in figure 1 shows the demand and the local supply. The trend in the graph shows that the curves representing local supply and demand never meet each other and thus does not form any equilibrium point or intersection point, this situation arises due to the fact that local supply has always been insufficient to fulfill the demand, moreover the price has been increasing constantly leading to further deviation of these curves instead of any possible intersection.

Chapter 6

SUMMARY AND CONCLUSION

A brief summary of research along with the major findings of the research are obtainable in this chapter. Policy recommendations built on the outcomes of the current study are also suggested for organizers and administrators.

6.1 Introduction

From the ancient years in India, sheep and goat have an inseparable identity with the farmers. The ownership of the livestock is more evenly distributed with landless laborers and marginal farmers owning bulk of livestock. They play a key part for the rearing community in India especially for the marginal and small farmers. The women in rural areas plays a very significant role with respect to animal husbandry and they are directly involved in the operations such as feeding, breeding and management of well- being and supervision of the animals. In addition, they are like assets to the farmers, whenever there is a crop failure due to some natural causes and other adverse conditions. They may be also called as man's first helpmates providing him with meat, milk, wool and skin. If the livestock sector progresses, it will result in equitable growth of the rural economy particularly in reducing the poverty amongst the weaker sections. Spreading of livestock prosperity is more egalitarian, compared to land. Hence, from the fairness and livelihood viewpoint it is measured as significant module in poverty alleviation programmes. The fact is that combination of livestock rearing and crop production enables proper utilization of farm. The major factor for raising the income and living standards of rural household are increase in desire for livestock products from the consumers.

Sheep and goat rearing practices is followed from the civilization of the human beings over the period of years, millions of people in the world are benefited from it. Europe, Asia, South America, Australia and New Zealand are the major sheep and goat rearing countries of the world. The livestock products

have a high income elasticity of demand and is likely to grow at a faster rate. The improvement in the productivity of livestock and their raising by the poor segment of the community in countryside area can be looked up on as a major instrument, for effecting social change by improving the income of these people. This will enable them to augment their incomes and bring them above the poverty line and would also help in reducing the disparities between the per capita income in rural and urban sector. Livestock rearing enables the village masses to earn additional income for their family.

Objectives:

- To estimate the production performance of mutton under various rearing systems.
- To examine the demand, supply and price scenario of mutton trade.

6.2 Major findings of the study

The most important findings of the study are summarized below:

1. In general, socio-economic characteristics of the sample farmers indicated that majority of the sheep and goat farmers belonged to age group of above 40 years and are illiterate in extensive and semi-intensive rearing (above 60 %). The family size of sheep and goat rearing households have medium size with 6-7 members.
2. Across the livestock census, growth in sheep and goat population was positive except during 2007-2012, mainly due to severe drought in country as a whole. While mixed growth trend across livestock census was observed in the study area and Kashmir state as a whole.
3. The average number of sheep per household were 67 and 28 under extensive and semi-intensive method per farm.
4. All the farmers had kaccha type of shed for rearing sheep and goat, in extensive (100%), while in case of semi-intensive rearing (12.5%) of

farmers had kaccha type (62.5%) had pacca type and (25%) had mixed type of shed.

5. The major marketing channel adopted was found to be channel I (26) where the farmer directly sold his produce to the village/local butcher, while the channel II was less preferred (14) as it involved huge financial support.
6. The major source of returns in sheep and goat rearing in both extensive and semi-extensive rearing was from sale of the animals in all the rearing methods, followed by sale of lamb, manure and sale of skin.
7. The total cost per annum per animal was relatively low in extensive rearing method (₹3,850), while for semi-intensive rearing was found to be (₹7,591)
8. The net return per animal was higher in case of semi-intensive rearing (₹5,638) and in case of extensive rearing was found to be (₹3,796).
9. Comparing the mean technical efficiency of semi-intensive farmers, it was higher (0.862) than extensive rearing methods (0.745). Similarly in case of extensive rearing mean economic efficiency was higher (0.90) while in semi-intensive was (0.89) and in case of allocative efficiencies, extensive had higher efficiency (1.32) while in semi-intensive it was (1.28) respectively.

6.3 Policy suggestions/recommendation

Following suggestions are recommended for improvement of the mutton production in the study area based on findings

- There is a decreasing trend in the sheep and goat population in the Kashmir Valley despite vast grazing land availability. Profitability of sheep and goat rearing indicate potential of this enterprise, which need to be encouraged with the objective of creating wealth and employment opportunities in the study area.

- Government initiatives must be taken to facilitate various schemes so that a greater number of people are encouraged to involve in the small ruminant production system.
- Due to high capital to start the enterprise, support policies must be formulated in order to enhance the livelihood of small and marginal farmers which can be done by providing them credit at a low interest rates as well as through subsidies.

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CERTIFICATE

Certified that all the corrections/amendments as suggested by External Examiner **Dr. Mahua Bhttacharjee,** Professor (Economics) Amity University, Noida during Viva-Voce examination held on 15-07-2022 have been incorporated in the manuscript entitled **"Economic analysis of mutton production and trade in Kashmir"** submitted by **Mr. Athar Bashir (Regd. No. MSAE-12-2019)**

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