

PRODUCTION AND MARKETING OF CAMEL PRODUCTS IN SEMI-DESERT AND DESERT AREAS OF PAKISTAN

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Abstract:- The study was designed to analyze the production and marketing of camel products in the semi-desert and desert areas of Pakistan. It is based on cross-sectional data collected through simple random sampling technique in April, 2011 from 220 camel farmers and 17 market intermediaries. It is found that both camel farmers and market intermediaries were less educated. It is observed that markets for camel milk, meat, hides and hair are less established in semi desert and desert areas of the country. Mean production of milk per farm household was 5.4 and 6.5 liters per day in summer and winter seasons, respectively; however, none of the surveyed farmers reported milk sale. During last one year, sales of camel hides and hair were reported by few farmers (6% each). Mean purchase price of camel hides reported by shopkeepers in nearby town markets were higher than village level prices by 74.6 % and even more in case of hair. This is an indicative of camel farmers' exploitation by the village dealers. Mean quantity of hair sales was about 20 kg per farm per annum. Camel hair are also used by the farmers for making ropes, rugs and blankets, but all these byproducts are not marketed. Shares of farmers in the consumer rupee for camel meat, milk, hides and hair were about 61%, 75%, 52% and 26%, respectively. Keeping in view poor status of camel products' markets, development of proper marketing system and structure for camel products by involving camel farmers and other local stakeholders is recommended to benefit the local communities by ameliorating supply of camel products in local markets.

Key Words: Camel; Socio Economic Status; Products; Production; Marketing; Desert Areas; Semi-desert Areas; Pakistan.

INTRODUCTION

Camel is an important animal in the livestock herds of the country and is of great socioeconomic importance. They are mainly used as pack/draft animal with milk, meat, hair and hides as products. Camels survive mostly in the difficult arid, drought-stricken areas and mountainous regions where the long-term

survival of other livestock does not seem possible, with surprisingly low inputs as most of the time they browse the tops of trees and shrubs. Thus, camels contribute significantly to the food security of the farmer households in these regions (Khan et al., 2003). Moreover camels may be used to combat the growing desertification in these areas (Raziq et al., 2008).

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Total camel population in the Pakistan was about 1.00 million in 2010 (GoP, 2012). Camel farming systems are changing over time, sedentary camel farming system is dominating transhumant and nomadic camel farming systems (Aujla et al., 2012). Under transhumant and nomadic camel farming systems, camel has almost no competition for feed with other animals as it is a hardy animal and comparatively eats less (Ahmad et al., 2010). Camel can serve the best useful addition to the food supply chain in terms of milk, meat and other products. Contribution of camel milk in the total milk production in Pakistan is 1.8 % (818 thousand tons). Camel meat is also exported from Pakistan along with beef and mutton. Value of total meat exported by the country in 2008-09 was US \$ 74.4 million (GoP, 2012). Camel hides and hair are also used to manufacture many useful by-products viz., ladies handbags, spectacle jackets, wallets, shoes, blankets, floor mats, tent cloth and ropes (Khan et al., 2003). In desert ecologies of the country, camel meat is a special dish at large wedding banquets and also served to highly esteemed guests. Camel is also becoming increasing popular as a sacrificial animal at the occasion of Eid-ul-Azha (Ahmad et al., 2010). Mainly young animals are preferred for slaughter on the occasion of Eid (Khan et al., 2003). Camel meat has been scored as high as or better than beef by taste panels in the Arab states. Even outside Arab states, meat from young camels has been graded as having the taste of prime beef (Ahmad et al., 2010). In Pakistan 50,000 t of camel meat is produced annually (GoP, 2008), which makes

about 1.5 % of the total meat production and a small proportion of the meat consumption in the country. However, in several African and Asian countries, the consumption of camel meat is between 5% and 50% of nationally produced red meat. The meat is usually eaten fresh, cooked in pieces or minced, but is sometimes air dried. Meat from camels is also used for sausages, in all forms of its cooking and taste qualities are similar to those made from beef. International review of literature revealed that camel market are not well developed in the world except in Sudan, but lucrative export opportunities to Egypt, Libya, Saudi Arabia and Gulf states exist (Khan et al., 2003).

Aujla et al. (1998) studied socio-economic profile of camel herders in Balochistan and stated that 26% - 60% camel farmers reported to face exploitation by middlemen in marketing of camel products at various locations in the province. They further stated that markets for camel products are poorly developed and dominated by private sector. Better camel husbandry practices and marketing can improve the life of farmers, who largely earn their living through raising camels. In spite of all the socioeconomic importance of the camels, its potential for increasing food supplies and family income in desert and mountainous ecologies has almost been ignored by planners and researchers. Information about the production, use and marketing of camel products is necessary to access the current status of marketing infrastructure, to improve the conditions and efficiency of these markets. This study has therefore been designed to examine the marketing systems of camel products in the country.

Specific objectives of this study were to describe the socioeconomic characteristics of the farmers and market intermediaries; to study the production and disposal patterns of camel products; to find out sources of information of farmers about prices of camel products; and to identify constraints and recommend measures for improving production and marketing of camel products.

MATERIALS AND METHOD

The study is mainly based on cross-sectional data; moreover, secondary information from various public sources and published literature has also been amassed to support the findings of the field survey. A set of questionnaire was prepared to collect data from camel farmers and various camel by-product dealers or market intermediaries. The questionnaires were pre-tested in Bahawalpur district of Punjab province, so that any important information should not have missed. The data for this study were collected in April, 2011. Leading divisions by camel population from all provinces, based on camel population statistics given in Livestock Census (GoP, 2006) were selected for the study. Dera Ghazi Khan and Bahawalpur Divisions are leading ones by camel population in Punjab province. Mirpurkhas is a leading division in Sindh province. Quetta and Kalat Divisions are leading ones in Balochistan province. Dera Ismail Khan is the largest division by camel population in Khyber Pakhtunkhwa. Seven districts from all provinces of the country were surveyed for data collection viz., Layyah (Dera Ghazi Khan Division) and Bahawalpur (Bahawalpur Divi-

sion) from Punjab, Tharparkar and Umarkot (Mirpurkhas Division) from Sindh, Chagai (Quetta Division) and Kharan (Kalat Division) from Balochistan and Dera Ismail Khan (Dera Ismail Khan division) from Khyber Pakhtunkhwa (KPK).

The simple random sampling technique was used to select the sample for the study. Sample size for this study comprised 220 camel farmers; 70 from Balochistan, 63 from Punjab, 50 from Sindh and 37 from Khyber Pakhtunkhwa. The sample size of the provinces were based on share of the provinces in total camel population of the country as well as on availability and willingness of the farmers for formal interviews. Farmers belonged to Yazman, Chobara and Layyah talukas in Punjab; Mithi, Diplo, Umarkot, Chachro, and Nagarparkar in Sindh; Darban, Darazind and Paharpur in Khyber Pakhtunkhwa, and Chagai, Dalbadin and Kharan in Balochistan. These areas were selected in consultation with local communities and agricultural extension departments of the respective districts. Moreover, to study the meat marketing, six butchers; one each from Layyah district (Punjab), Kharan district (Balochistan), Umarkot (Sindh) and three from Dera Ismail Khan district (Khyber Pakhtunkhwa) were randomly interviewed. To study the hides marketing, six hide dealers; one from Umarkot district, two from Tharparkar district (Sindh) and three from Dera Ismail Khan district (Khyber Pakhtunkhwa) were also randomly interviewed. Furthermore, three milk shopkeepers; one from Chagai district (Balochistan) and two from Bahawalpur district (Punjab) were randomly interviewed to study the milk marketing.

To study the hair marketing two hair shopkeepers were also randomly interviewed from Dera Ismail Khan district (Khyber Pakhtunkhwa).

SPSS package was used for data compilation and analysis. The descriptive analysis has been carried out to calculate the frequencies of the demographic characteristics and for other variables which are used in the categorical form. Numerical operations are applied to all other variables that are unconditional and their respective means and standard deviations have been calculated. Gross margins for camel butchers and hair shopkeepers were the differences between sale and purchase prices of these commodities as shown by the following expression.

$$GM = SP - PP$$

where,

GM = gross margin, SP = sale price and PP = purchase price. Net margins were derived by deducting marketing cost per kg of meat/hair from gross margins by following expression.

$$NM = GM - MC$$

where,

NM = net margin, GM = gross margin, MC = marketing cost.

Marketing cost includes shop rent, utility (electricity and telephone) bills and salaries of the hired workers in case of camel meat; and it includes shop rent and expenditures on utility bills in case of camel hair. The producer shares in consumer rupee are calculated for the camel meat, milk, hides and hair by the following formula;

$$FP / MP * 100$$

where,

FP = price received by the farmer in case of sale to the village dealers
MP = market price which consumers pay to the shopkeepers in town/city markets.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Respondents

Mean age of the sampled camel farmers was about 48 years with average camel keeping experience of 32 years (Table 1). Aujla et al. (1998) studied the socioeconomic profile of

Table 1. Socioeconomic characteristic of camel farmers

Characteristics	Punjab	Sindh	KPK	Balochistan	Pakistan
Age (years)	50.1±15.6	45.8±15.3	31.7±13.0	57.0±11.4	48.2±16.2
Education (years)	1.4±3.4	3.6±5.0	2.6±4.0	0.5±2.1	1.8±3.8
Camel farming experience (years)	34.6±16.9	28.0±15.4	16.4±10.1	40.6±11.9	31.9±16.3
Household (HH) size (No.)	11.1±6.3	11.7±6.4	15.0±10.0	15.7±7.2	13.4±7.6
HH members engaged in camel farming (No.)	1.8±1.6	2.0±2.4	2.6±1.7	1.6±0.6	1.9±1.6
Land holding (acre)	17.3±18.5	31.5±41.5	35.7±94.8	130.1±294.4	50.8±155.2

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Table 2. Socioeconomic characteristics of market intermediaries

Characteristics	Butchers	Milk shopkeepers	Hides shopkeepers	Hair shopkeepers
Age (years)	34.3 ± 11.8	36.2 ± 17.0	47.8 ± 6.0	48.4 ± 4.9
Education (years)	0.7 ± 1.6	6.3 ± 4.0	5.8 ± 5.1	6.0 ± 2.8
Experience (years)	19.3 ± 14.2	7.0 ± 4.9	22.5 ± 15.3	20.5 ± 27.6

camel herders in Balochistan and declared low literacy level of the farmers as the main reason of subsistence level of camel farming. Similarly, education level of the sampled farmers was very low in the study area with mean formal schooling of about two years. Camel herders generally have large families with mean family size of 13.4 and employment of two family members in camel farming. Mean household size of the sample farmers was highest in Balochistan (15.7) with lowest in Punjab (11.1). Highest employment of family members in camel farming was in Khyber Pakhtunkhwa (2.6) with lowest in Balochistan (1.6). Camels are grazed in rangelands/pastures in Balochistan, while in Khyber Pakhtunkhwa limited fodder resources resulted in relatively more employment of family members. Mean landholding of the sampled camel farmers was highest in Balochistan (130.1 acre), with a lowest in Punjab (17.3 acre).

Mean age and experience of the camel butchers were about 34 years and 19 years, respectively (Table 2). Most of the butchers were illiterate (83%), while remaining were educated up to primary level. Mean age of the milk sellers was about 36 years with experience of seven years and formal education of six years. Mean age of the hide shopkeepers was 48 years with experience of 23 years and formal education of six years. Average age of hair shopkeepers was 48 years with six years of schooling and experience of 21 years. Thus, it seems that market intermediaries were also poorly educated (Table 2).

Camel Ownership of the Sample Farmers

In the country, camels are kept in mix herds of livestock. Mean camel herd size was largest in Balochistan (33) followed by Punjab (26), Sindh (16) and Khyber Pakhtunkhwa (2). On the whole, a herd of camels in the

Table 3. Camel ownership of the sampled farmers

Parameters	Punjab	Sindh	KPK	Balochistan	Pakistan
	(No.)				
Male	1.3 ± 1.7	2.3 ± 1.3	0.6 ± 1.0	3.6 ± 3.2	2.1 ± 2.4
Wet Female	4.4 ± 4.3	4.3 ± 3.6	0.3 ± 0.5	8.4 ± 6.7	5.0 ± 5.5
Dry Female	16.3 ± 23.0	5.7 ± 7.3	0.8 ± 1.3	7.4 ± 12.4	8.4 ± 15.5
Young Stock	4.0 ± 3.7	3.2 ± 2.7	0.3 ± 0.5	13.6 ± 13.0	6.3 ± 9.2
Total	26.1 ± 29.5	15.5 ± 12.6	2.0 ± 1.8	32.9 ± 31.1	21.8 ± 26.6

survey areas of the country comprised 22 animals; two males, 14 females (five milking and nine non-milking) and six young stocks (Table 3).

Camel Products and Marketing

Meat

Camel meat is largely consumed in remote rural areas, but cities are no exception. The meat of camel slaughtered at age of 3 to 4 years tastes like beef, but most of the people here have not developed taste for it. Only a limited number of castrated males are raised especially for slaughter. Thus, camel meat mainly comes from old males and females that have served usefully in other functions in earlier life (Khan et al., 2003). During last one year, sale of live camels was reported as 54.1%, with mean of two camels per farm. Mean ages of adult male, milking female and non-milking female, male young stock and female young stock at the time of sale were 8.3, 10.8, 12.3, 1.8 and 2.3 years, respectively, with average sale prices of Rs.102523, Rs.84643, Rs.57800, Rs.43215 and Rs.45833, respectively.

Camel meat is marketed in all the surveyed districts along with other meats. About 60% of the sampled butchers reported to sell buffalo and goat meat, and 40% reported to sell sheep meat along with camel meat. Majority of the butchers (67%) reported to keep share with other butchers for camel meat, while remaining (33%) were sole slaughterers. Only one-third of the camel meat shopkeepers reported to slaughter camels at private or government slaughter houses. Few of them reported to slaughter camels daily except on officially ban days or twice a week

(17% each). About one-third of them, reported to slaughter camels twice a month and remaining one-third reported occasional slaughtering just on the availability of animals.

Butchers, who reported to keep share for camel meat with others, shared 20 to 160 kg meat, with mean weight of 75 kg per day and purchase price of Rs. 120 per kg. Half of share keeping butchers (50%), reported to pay main sharer either in cash or on credit. While, one-fourth (25%) reported to pay solely in cash and remaining one-fourth (25%) reported to purchase camel meat exclusively on credit. Mature weight of camels in Pakistan on average varies from 550 to 740 kg. Dressing percentages of camels are in the range of 45 to 55%, exceptionally up to 60% (Khan et al., 2003). The male dromedary (one-humped) carcass can weigh 400 kg or more (Dromedary, 2011). Butchers reported to purchase culled camels directly from farmers mostly in village level and sometimes in primary markets. Average purchase price of these camels was Rs. 60000, with a transportation cost of Rs.1875 per animal. Thus, cost of one kg camel meat was Rs.155 for them. Camel meat is not graded by the butchers for sales. Share keeping butchers purchased camel meat with mean prices of Rs.120 per kg and meat transportation cost of Rs.2 per kg. Thus, cost of one kg camel meat was Rs. 122 for them (Table 4). Sale prices of camel meat reported by sole slaughterers and share keeping butchers were Rs.245 and Rs.190 per kg, respectively. While, average market prices of beef and mutton in the study areas at the time of survey were Rs.208 and Rs.288 per kg, respectively. Gross margins for the

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Table 4. Camel meat marketing costs and margins

Costs/Margins	(Rs. kg ⁻¹)	
	Sole slaughters	Share keepers
Meat cost/purchase price	155	122
Sale price	245	190
Gross margin (GM)	90	68
Marketing cost (MC)	30	30
Net margin (NM=GM-MC)	60	38

sole slaughterers and share keeping butchers were Rs.90 and 68 per kg of camel meat. Average daily sales of camel meat by the butchers, who reported to slaughter camels on their own were 330 kg and that of share keeping butchers were 64 kg. Marketing cost per kg of camel meat including shop rent, utility (electricity and telephone) bills and salaries of the hired workers was Rs.30. Thus, net margins for sole slaughterers and share keeping butchers were Rs.60 and Rs.38 per kg, respectively. Farmers' share in consumer rupee for camel meat was about 61 %.

Milk

In Pakistan, 818 thousand tons of camel milk is produced annually

(GoP, 2012), which is 1.8% of the total milk production in the country. Average milk prices in the surveyed areas of the country were Rs. 900 per 40 kg. Thus, camel milk values at about Rs. 16.7 billion. Camel milk is not cherished in Pakistan and there is little demand for it (Khan et al., 2003). Total milk production per household across provinces as well as across seasons was different due to topographical and environmental differences across camel producing areas of the provinces. Camels are kept in rangelands and coastal areas of Balochistan, Cholistan and Thal deserts of Punjab, Tharparkar desert of Sindh and in semi-desert areas of Khyber Pakhtunkhwa. Thus, camel ownership per household and milk productivity of she-camels also differs across provinces. Reduction in heat-stress and improvement in availability of forages in winter season positively affect milk productivity. Thus, camel milk production per household was high in winter season than in summer season (Table 5). Mean milk production per household was 6.5 and 5.4 liters per day in winter and summer seasons, respectively. None of the farmers reported

Table 5. Camel milk production and consumption per household

Parameters	(l day ⁻¹)				
	Punjab	Sindh	KPK	Balochistan	Pakistan
Summer Season					
Total milk production	2.9 ± 3.3	11.0 ± 12.1	1.2 ± 2.2	4.8 ± 2.9	5.4 ± 7.4
Used for drinking	2.4 ± 3.1	10.4 ± 11.9	1.0 ± 1.8	3.9 ± 2.4	4.8 ± 7.2
Used for tea making	0.5 ± 0.9	0.6 ± 1.3	0.2 ± 0.5	0.9 ± 1.1	0.6 ± 1.0
Winter Season					
Total milk production	4.9 ± 4.7	13.4 ± 12.4	1.3 ± 2.7	5.0 ± 2.9	6.5 ± 8.0
Used for drinking	3.9 ± 3.7	12.7 ± 12.2	1.0 ± 1.9	3.9 ± 2.2	5.6 ± 7.8
Used for tea making	1.0 ± 1.2	0.7 ± 2.0	0.3 ± 0.8	1.1 ± 2.2	0.9 ± 1.4

milk sale or its use for preparing milk products. Most of the camel milk is used for drinking and about half liter in summer season and one liter in winter season per farming household is used for tea making (Table 5). Jasra et al. (1999) reported that in the mountainous areas of Balochistan, most of the camel milk is consumed by camel keeping families and negligible milk quantity enters into marketing process.

The camel milk produced in the far-off mountainous and desert areas cannot reach the urban markets and is utilized locally. Furthermore, camel milk is not cherished in Pakistan and there is practically very little market for camel's milk and meat (Afzal and Naqvi, 2004). However, camel milk is sold in big cities as pure milk, or mixed with milk of cows and buffaloes, especially when the supply of cows and buffaloes milk does not meet the market demand (Yaqoob and Nawaz, 2007). Usually, camel milk is utilized at subsistence level due to the lack of proper transportation facilities and unaffordable expenses of transportation. Milkmen (*Dodhees*) buy this milk from the producers and mix it with buffalo/cow milk and sell it in towns and cities. (Aujla et al., 1998).

Formal camel milk marketing systems do not exist in any of the provinces of the country. However in Bahawalpur district of Punjab, few shopkeepers reported to sell camel milk mixed with cow milk. Milkmen were the suppliers of milk to the milk shopkeepers. Mean daily sales of cow and camel mixed milk and cow milk at these shops were 520 and 340 kg, respectively. Average purchase prices of camel milk were Rs.900 per 40 kg and that cow milk were Rs.1100 per

40 kg and mean sale prices of cow and camel mixed milk and cow milk were Rs.1200 and Rs.1320 per 40 kg, respectively. Thus, gross margins per 40 kg of cow and camel mixed milk and cow milk were about Rs.200 and Rs.220, respectively. Farmers' share in consumer rupee for camel milk was about 75 %.

Hides

According to an estimate 22,500 camel hides are obtained annually in Pakistan ((Khan et al., 2003). Total number of hides obtained in the country in 2011-12 was estimated at 13.9 million (GoP, 2012). Thus, the share of camel hides in the total hides' production in the country is very nominal (about 0.2%). Camel hides are used to manufacture saddlers, sandals and beautiful decorative articles, some of which are also exported (Khan et al., 2003). Camel farmers and hide shopkeepers reported that proper camel hide markets do not exist in the country. However, in Umarmkot district, Mithi and Islamkot areas of Tharparkar district of Sindh and Pharpur area of Dera Ismail Khan district of Khyber Pakhtunkhwa few hide shopkeepers reported to deal with camel hides. All the shopkeepers in Sindh province reported to grade camel hides on the basis of number and extent of cuts during slaughtering and subjective judgment of their impact on the value of hides. However, shopkeepers in Khyber Pakhtunkhwa reported not to practice any sort of camel hides grading as the camel hides are mostly marketed by them in bulk.

On the producer side, during last one year sale of camel hides was 6.4% of the farmers in the surveyed areas of the country. All the farmers

Table 6. Camel hides marketing

Parameters	Punjab	Sindh	KPK	Balochistan	Pakistan
Hide marketing farmers (%)	2.0	10.0	0.0	11.0	6.0
Price (Rs. hide ⁻¹)	600	560 ± 134	0.0	388 ± 175	464 ± 175
Transportation cost (Rs. hide ⁻¹)	0.0	63 ± 48	0.0	33 ± 13	44 ± 32

in Punjab and Balochistan and majority of the farmers in Sindh province (60%) reported to sell camel hides to butchers and remaining (40%) reported to sell hides to village dealers / beoparies. Hides are generally marketed at the village level and prices are settled through bargaining. Farmers in Sindh and Balochistan reported to transport camel hides by vans to butchers/ hide dealers with a mean cost of Rs.63 per hide in Sindh and Rs.33 per hide in Balochistan. Average prices per hide reported by farmers were Rs.600 in Punjab, Rs.560 in Sindh and Rs.388 in Balochistan province with overall mean value of Rs.464 in the study area (Table 6). Farmers reported that shopkeepers in Sindh and village beoparies and fellow farmers in Balochistan were the main source of information about camel hide prices.

The sale volume of the camel hides reported by the shopkeepers ranged between 250-300 hides per annum in the study area. Mean purchase prices of camel hides reported by shopkeepers were Rs.810 per hide as against the mean price of Rs. 464 per hide received by the farmers at the village level (Table 6). So, there is a difference of Rs. 346 per hide (74.6%) at both levels. This is an indicative of camel farmers' exploitation by the village middlemen. With the purchase and sale prices of Rs. 810 and Rs. 910 per hide, respectively, gross margin

earned by shopkeepers was Rs.100 per hide. Marketing cost was estimated at Rs. 40 per hide; thus, net margin for hide shopkeepers was Rs.60 per hide. Increase in farmer share in consumer rupee for camel hide marketing is about 52% in direct sale to the shopkeepers, incorporating the mean transportation cost of Rs. 44 per hide from the villages to nearby town markets (Table 6).

Hair

Twenty thousand tons camel hair are produced in Pakistan and are used for manufacturing blankets, floor mats, carpets, tent cloth, bags and ropes (Khan et al., 2003). Estimated production of livestock hair in Pakistan in the year 2011-12 was 23.8 thousand tons (GoP, 2012). Thus, the share of camel hair in total livestock hair production was very decent (84%). Camel calves are born with a soft woolly fleece, which is usually shorn once and is mixed with camel hair for manufacturing blankets (Khan et al., 2003). Hair production of adult animals ranges annually between 1 and 3 kg (Ahmad et al., 2010). Generally, camel producers use camel hair for ropes and rugs making. In the study area, mean hair production was 2.0 kg per adult camel per annum and 1.2 kg per annum per young camel. Sale of camel hair was reported by six percent of the farmers. On the average, each farmer

Table 7. Camel hair production and marketing

Parameters	Punjab	Sindh	KPK	Balochistan	Pakistan
Hair production per adult camel (kg)	2.2 ± 0.5	2.3 ± 0.5	2.4 ± 1.6	1.6 ± 0.5	2.0 ± 0.8
Hair production per young camel (kg)	1.8 ± 0.7	1.2 ± 0.5	1.0 ± 1.5	0.9 ± 0.2	1.2 ± 0.7
Hair sale (% farmers)	3.0	0.0	14.0	7.0	6.0
Hair quantity sold (kg)	4.8 ± 2.5	0.0	5.6 ± 2.0	40.0 ± 20.0	19.8 ± 21.6
Hair price (Rs. kg ⁻¹)	16.0 ± 6.0	-	15.0 ± 6.0	11.0 ± 5.0	14.0 ± 5.0

reported to sale about 20 kg camel hair in the past one year. Most of the farmers reported to sale camel hair to village beoparies (73%), followed by fellow farmers (18%) and village shopkeepers (9%). Thus, hair transportation cost was zero. Mean prices of hair reported by farmers were Rs. 14 per kg with highest in Punjab and lowest in Balochsitan (Table 7). In camel hair, village beoparies were reported as sole source of information about prices by the respondents in Punjab province. While, in Khyber Pakh-

tunkhwa (KPK) and Balochistan farmers reported shopkeepers, middlemen/ beoparies and fellow farmers as source of information about the hair prices.

Ropes, rugs and blankets are reported as main hair products made by the farmers primarily for domestic use (Table 8). Little less than half of the farmers in the study area (46%) reported rope making with mean annual production of 10 ropes farm⁻¹ and mean length of about 7m. Percentage of rope making farmers was

Table 8. Camel hair products

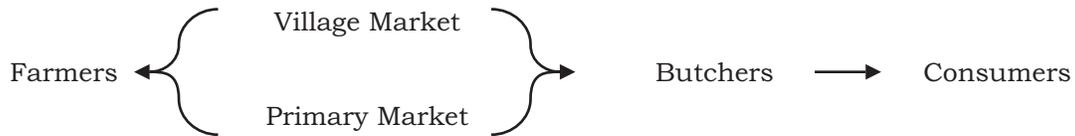
Parameters	Punjab	Sindh	KPK	Balochistan	Pakistan
Rope making (% farmers)	44.0	16.0	19.0	83.0	46.0
Average number of ropes made	10.5 ± 7.7	3.9 ± 2.2	3.6 ± 2.9	10.4 ± 8.4	9.4 ± 7.9
Average length of ropes (m ²)	9.3 ± 12.2	9.0 ± 4.9	11.0 ± 16.3	5.5 ± 1.6	6.8 ± 6.9
Rug making (% farmers)	0.0	0.0	0.0	74.0	24.0
Average number of rugs made	-	-	-	4.2 ± 4.2	4.2 ± 4.2
Average size of rug (ft ²)	-	-	-	19.5 ± 7.9	19.5 ± 7.9
Blanket making (% farmers)	3.0	-	41.0	61.0	27.0
Average number of blankets made	3.5 ± 3.5	-	3.0 ± 2.0	4.4 ± 2.9	4.1 ± 2.7
Average size of blanket (ft ²)	-	-	-	27.1 ± 9.9	27.1 ± 9.9

highest in Balochistan, followed by in Punjab, Khyber Pakhtunkhwa and Sindh. Rug making was reported only in the Balochistan province and most of the farmers (74%) reported rug making in this province. Average number of rugs produced per farm was four per annum with a mean size of about 20ft². Use of camel hair for blanket making was reported by 27% farmers in surveyed areas of the country. Majority of the farmers in Balochistan (61%) and some farmers in Khyber Pakhtunkhwa (41%) and Punjab (3%) reported to make blankets. Mean number of blankets produced per farm was four per annum

with a mean size of about 27 ft² (Table 8).

Farmers reported that the hair products made by them at domestic level are used by themselves and sometimes exchanged with or gifted to others. That's why, in the surveyed areas proper camel hair/ hair product markets do not exist. However, there are few animal hair shops in the Dera Ismail Khan district of Khyber Pakhtunkhwa province. Shopkeepers reported that hairs are solely supplied by the camel farmers, thus market intermediaries are not involved in camel hair business. Shopkeepers bargain hair prices with the farmers

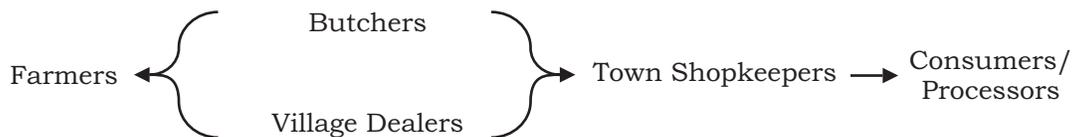
Meat Marketing



Milk Marketing



Hides Marketing



Hair/Hair Products Marketing

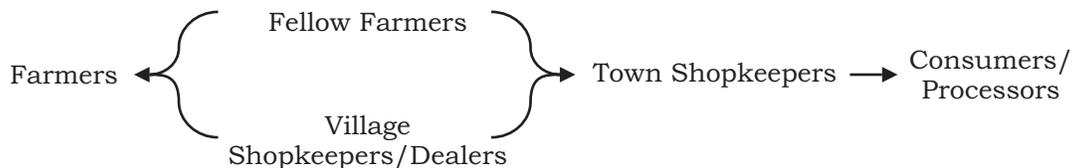


Figure 1. Marketing channels of camel products

and pay them in cash. Shopkeepers reported sale of about 4t camel and sheep hair each during last one year. Mean purchase and sale prices of camel hair reported by the shopkeepers in the district Dera Ismail Khan were Rs. 43 and Rs. 53, respectively; thus, gross margin earned by them was Rs. 10 kg⁻¹. While, marketing cost per kg of hair was Rs. 2 including shop rent and expenditures on utility bills; resulting into net margin of Rs.8 kg⁻¹. Average purchase price of sheep hair was also the same as that of camel hair with a gross margin of Rs. 6 kg⁻¹ and a net margin of Rs. 4 kg⁻¹. The analysis revealed that the camel hair producers' share in consumer rupee was 26 %. Marketing channels of various camel products as discussed in previous sections have been presented in Figure 1.

Marketing Constraints and Problems

The marketing of camel by-products involve many constraints. The major constraint is the lack of camel farmers' access to the markets as the camel markets are generally located in major cities or towns and are far away from the villages. Moreover, proper market infrastructure and facilities are lacking in the markets. The situation compels poorly educated farmers to sell camel products to the village *beoparies* and fellow farmers at relatively low prices. Thus, camel farmers are facing exploitation from the village *beoparies*, who purchase camel products at low prices. The meat quality is poor, as culled/weak camels are generally slaughtered by the butchers. Moreover, formal camel milk marketing systems do not exist as most of the milk is used for drinking or tea making.

RECOMMENDATIONS

The study mainly focus on the marketing of camel products to develop the consensus about the importance of proper marketing infrastructure to gain the full potential benefits from this precious animal. It is found that camel meat and milk market are not well established in the country. Camel meat is not liked by the people as it generally comes from culled/weak animals. Similarly, camel milk is not cherished in the country due to its slightly salty taste and usually low total solids.

Therefore following are the recommendations not only to help in ameliorating supply of camel by-products but also elevate the socioeconomic conditions of camel farming households.

- Government should actively intervene in camel meat markets and bound butchers to slaughter healthy animals of not more than three to four years of age. As the meat of camel slaughtered at this age tastes like beef, though most of the people have not developed taste for it.
- Food technologists should devise method for conversion of salty camel milk into quality cheese for the camel farmers, which can be eaten in raw form or can be used for making pizzas and other dishes.
- Establishment of educational institutions and skill development of the people should also be given due consideration in camel producing desert/semi-desert areas of the country.
- Along with public sector, private sector should also come forward

to teach camel producing households appropriate methods to convert camel hides and hair into marketable products.

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