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ARTICLES

Small Ruminant's Economy of Semi-Arid Region in Haryana

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I

INTRODUCTION

Of late, sheep and goat farming is also gaining importance in Haryana due to the sub-division and fragmentation of land holdings, on the one hand and surplus family labour on the other. Sheep and goat farming suits well in arid and semi arid regions of Haryana with marginal and sub-marginal lands. Due to their flexible feeding habits, it is one of the highly appropriate livestock species for utilising sparse vegetation available all over the state. Indeed, small ruminants assume further importance in rainfed and ecologically fragile areas. Sheep and goats are the ruminants which provide animal protein through their milk and meat, manure for fields, hides, skin and wool to industries as raw material. Small ruminants, besides providing their socio-economic role towards the well being and livelihood to relatively lower strata of rural and sub-urban societies, also constitute naturally renewable resources across agro-ecological environments in various farming systems. Yet, small ruminants could not get the desired attention of agricultural economists, as a consequence factual information on their bio-economic traits, disposal pattern, marketing cost and margins through various channels of live animals and factors affecting their market prices is lacking. Therefore, the present study has been undertaken with the following specific objectives: (1) To analyse the bio-economic traits, costs and returns from sheep and goat farming; (2) To study the disposal pattern, marketing cost and margins through various channels of live animals (sheep and goat), and (3) To ascertain the factors which affect the market prices of ewe, ram, lactating and dry pregnant goats and buck.

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II

DATA AND METHODOLOGY

Multi-stage random sampling technique, wherein the selection of districts, tehsils, villages and respondents formed the first, second, third and ultimate units of the sample, was used for this study. Keeping in view the density of sheep and goats amongst ten semi-arid districts in Haryana, Mahendergarh district for sheep and Gurgaon district for goats were purposively selected. Similarly, Narnaul tehsil from Mahendergarh while Ferozepur Jhirka from Gurgaon district with greater concentration of sheep and goats were purposively selected. Again, eleven villages from each tehsil with highest concentration of sheep and goats were randomly selected. All the sheep and goat rearers of the selected villages in both the districts constituted the ultimate unit of sample which were arranged in ascending order as the per number of sheep and goats reared by them. Subsequently, with the help of cumulative total method, they were categorised as small (up to 50 for sheep and up to 22 for goats), medium (between 50 and 80 for sheep while 22 and 40 for goats) and large (80 and above for sheep while 40 and above for goats). In all, there were 117 and 113 sheep and goat rearers in the sample, respectively. From amongst various markets of the selected tehsils in both the districts, one market each was randomly taken in the sample. Furthermore, the sample also included 5 village middlemen, 15 local traders, 10 wholesalers and 8 butchers in Ferozepur Jhirka market of Gurgaon district while 10 village middlemen, 10 local traders, 5 wholesalers and 6 butchers in Narnaul market of Mahendergarh district.

Both primary and secondary data were collected. The secondary data were compiled from the *Statistical Abstracts of Haryana* (Anonymous, 2002) and from the records of Animal Husbandry Department, Government of Haryana. For collection of primary data from sample respondents, a proforma was specially structured and pre-tested and the data were collected through personal survey method during the period July 2001 to August 2002. The data included the general information about the sheep and goat rearers, their source of earnings, farm and family inventories, land holdings, capital and farm resources, livestock herd strength, economic traits of sheep and goats, feeding and grazing practices followed, particulars about the disposal pattern of live animals through various marketing channels, marketing charges of market functionaries, factors which affect the market prices of sheep and goats trade, etc. Tabular analysis was done for the existing status of sheep and goat rearers, compositional structure of their herds, the economic traits, viable herd strength, costs and returns from sheep and goat rearing, disposal pattern and marketing cost and margins of live animals. The various marketing channels identified for disposal of live animals (sheep and goat) were:

Channel-I	:	Farmer-Farmer,
Channel-II	:	Farmer-Butcher,

Channel-III	:	Farmer-Village middlemen-Wholesaler,
Channel-IV	:	Farmer-Village middlemen-Local trader-Wholesaler,
Channel-V	:	Farmer-Village middlemen-Butcher.

Both quadratic and multiple linear regression equations were fitted to ascertain the factors which affect the market prices of ewe, ram, lactating as well as dry pregnant goats and buck but later was found to be the best fit, as per coefficient of multiple determination, size and sign of regression coefficients together with their levels of significance (Mondal and Pandey, 1993; 1995). Thus, the multiple linear regression model for ewe, ram, lactating and dry pregnant goats and buck was specified separately as under:

(a) *Multiple Linear Regression Equation for Ewes*:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + b_9 X_9 + U \quad \ldots. (1)$$

Where,

Y	=	Market price of female sheep (ewe) on the day of sale in rupees,
a	=	Constant,
bi's	=	Regression coefficients,
X_1	=	Age of ewe on the day of sale in years,
X_2	=	Wool yield of ewe in grams,
X_3	=	Body weight of ewe in kilograms,
X_4	=	Breed of ewe (Descript = 2, Non-descript = 1),
X_5	=	Prolificacy performance (number of lambs per lambing),
X_6	=	Lambing interval in days,
X_7	=	Quality of wool (Fine = 2, Coarse = 1),
X_8	=	General appearance (Good = 2, Bad = 1),
X_9	=	Season of sale/purchase (Winter=2, Summer=1),
U	=	Error term.

(b) *Multiple Linear Regression Equation for Rams:*

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + U \quad \ldots. (2)$$

Where,

Y	=	Market price of ram on the day of sale in rupees,
a	=	Constant,
bi's	=	Regression coefficients,

X_1 = Age of ram in years,
X_2 = Body weight of ram in kilograms,
X_3 = Wool yield of ram in grams,
X_4 = Age of ram at maturity in months,
X_5 = Breed of ram (Descript=2, Non-descript=1),
X_6 = General appearance (Good=2, Bad=1),
X_7 = Quality of wool (Fine=2, Coarse=1),
X_8 = Season of sale/purchase (Winter=2, Summer=1),
U = Error term.

(c) *Multiple Linear Regression Equation for Lactating Goats:*

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + b_9 X_9 + b_{10} X_{10} + b_{11} X_{11} + b_{12} X_{12} + b_{13} X_{13} + U \quad \text{.... (3)}$$

Where,

Y = Market price of lactating goat on the day of sale in rupees,
a = Constant,
bi's = Regression coefficients,
X_1 = Milk yield of goat in milliliter,
X_2 = Order of lactation,
X_3 = Stage of lactation in months,
X_4 = Body weight of animal in kilograms,
X_5 = Breed of animal (Descript=2, Non-descript=1),
X_6 = Attachment and placement of Udder (High and Rear=2, Pendulous=1),
X_7 = General appearance (Good=2, Bad=1),
X_8 = Kidding interval in days,
X_9 = Service period in days,
X_{10} = Prolificacy performance (number of kids per kidding),
X_{11} = Season of sale/purchase (Winter=2, Summer=1),
X_{12} = Age of animal at first kidding in months,
X_{13} = Age of animal at the time of sale in years,
U = Error term.

(d) *Multiple Linear Regression Equation for Dry Pregnant Goats*:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + U \quad \text{.... (4)}$$

Where,

Y = Market price of dry pregnant goat on the day of sale in rupees,
a = Constant,
bi's = Regression coefficients,

X_1 = Stage of pregnancy in months,
X_2 = Age of animal in years,
X_3 = Body weight of animal in kilograms,
X_4 = Breed of animal (Descript=2, Non-descript=1),
X_5 = Size of teats (Normal=2, Abnormal=1),
X_6 = Attachment and placement of Udder (High and Rear=2, Pendulous=1),
X_7 = General appearance (Good=2, Bad=1),
X_8 = Season of sale/purchase (Winter=2, Summer=1),
U = Error term.

(c) Multiple linear regression equation for male goats (buck):

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + U \quad \ldots. (5)$$

Where,

Y = Market price of male goat (buck) on the day of sale in rupees
a = Constant
bi's = Regression coefficients
X_1 = Age of buck in years
X_2 = Body weight of buck in kilograms
X_3 = Age of buck at maturity in months
X_4 = Breed of buck (Descript=2, Non-descript=1)
X_5 = General appearance (Good=2, Bad=1)
X_6 = Season of sale/purchase (Winter=2, Summer=1)
U = Error term.

RESULTS AND DISCUSSION

I. BIO-ECONOMIC TRAITS OF SHEEP AND GOATS

(i) *Socio-Economic Status of Sheep and Goat Rearers:*

Table 1 gives the status of sheep and goat rearers on sample farms in semi-arid region of Haryana during 2001-02. A majority of these rearers possessed small and medium herds, were illiterate, landless, marginal and small farmers, practiced self rearing and all the rearers of both the species did not have training from any institute. Eighty five per cent of both the sheep and goat rearers were upto 55 years of age, 54 and 33 per cent of them belonged to their traditional castes and average family size was 8 and 7, respectively. The average investments on sheep and goats were 72 and 37 thousand rupees, respectively which varied across categories. Likewise, the average grazing hours/day on sheep and goat farms were 7.4 and 7.8 hours,

respectively and 67 and 65 per cent of sheep and goat farmers, respectively, had pucca houses.

TABLE 1. SOCIO-ECONOMIC STATUS OF SHEEP AND GOAT REARERS IN SEMI-ARID REGION OF HARYANA

Sr. No.	Particulars	Sheep				Goat			
		Small	Medium	Large	Average	Small	Medium	Large	Average
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1.	No. of farmers	66	34	17	39	66	31	16	38
2.	Percentage of literacy to total	35	20	21	25	26	39	16	27
3.	Percentage of farmers up to 55 years of age	89	91	76	85	86	77	93	85
4.	Percentage of traditional caste* farmers to total	38	65	59	54	41	39	19	33
5.	Average family size	8	7	8	8	7	8	7	7
	(a) Adult	4	4	4	4	4	4	3	4
	(b) Children	4	3	4	4	3	4	4	4
6.	Percentage of untrained farmers to total	100	100	100	100	100	100	100	100
7.	Landholding status								
	(a) Landless	39	20	6	22	38	20	6	21
	(b) Upto 1 ha	7	8	6	7	10	5	2	9
	(c) 1-3 ha	19	3	3	9	14	6	8	9
	(d) Above 3 ha	1	3	2	2	4	0	0	1
8.	Average investment on small ruminants ('000 Rs.)	32	59	124	72	17	32	63	37
9.	Percentage of self rearing farmers to total	98	91	47	79	100	87	87	91
10.	Average grazing hours/day	7.5	7.0	7.8	7.4	9	7	7.3	7.8
11.	Percentage of farmers having pucca houses to total	65	65	100	77	57	68	6.9	65

* Traditional caste people are Gujjar, Banjara, Ahir and non-traditional group include Dhanak, Muslim, Khatik, Balmiki, Jat, Saini.

(ii) *Compositional Structure and Bio-economic Traits*

The small, medium and large-sized sheep farmers had 32, 62 and 124 sheep, respectively, in their herds. Of these, there were 23, 47 and 93 above one year of age while 9, 15 and 31 below one year. The average age at maturity and first lambing were about 12 and 17 months while gestation and dry periods about 148 and 52 days, respectively. Likewise, the sample farms had three lambings in two years, one lamb per lambing and about 191 days as lambing interval. The average mortality rate was about 6 per cent in adult sheep while was about 10 per cent in young stock (Table 2).

TABLE 2. GROUPWISE COMPOSITIONAL STRUCTURE AND BIO-ECONOMIC TRAITS OF SHEEP AND GOATS ON SAMPLE FARMS IN SEMI-ARID REGION OF HARYANA (2001-2002)

Sr. No. (1)	Particulars (2)	Small (3)	Medium (4)	Large (5)	Total (6)
I.	Sheep				
(i)	Number of sheep per farmer	32	62	124	218
(ii)	Sheep (over one year)				
	(a) Male	2	4	8	14
	(b) Female	21	43	85	149
	Total	23	47	93	163
(iii)	Sheep (below one year)				
	(a) Male	2	4	9	15
	(b) Female	7	11	22	40
	Total	9	15	31	55
(iv)	Age at maturity (months)	11.98	12.20	12.35	12.18*
(v)	Age at first lambing (months)	16.97	17.30	17.34	17.20*
(vi)	Gestation period (days)	148.90	149.00	146.20	148.03*
(vii)	Dry period (days)	50.10	49.38	55.03	51.50*
(viii)	Lambing rate				
	(a) Number of lambings in two years	3	3	3	3*
	(b) Average number of lambs per lambing	1.20	1.00	1.13	1.11
	(c) Lambing interval (days)	191.2	189.5	193.8	191.2*
(ix)	Mortality (per cent)				
	(a) Adult sheep	6	8	5	6.3*
	(b) Youngstocks	11	8	10	9.6*
II.	Goat				
(i)	Number of goats per farmer	14	29	57	100
(ii)	Goats (Over one year)				
	(a) Male	1	1	3	5
	(b) Female	9	20	40	69
	Total	10	21	43	74
(iii)	Goats (Below one year)				
	(a) Male	1	2	4	7
	(b) Female	3	6	10	19
	Total	4	8	14	26
(iv)	Age at maturity (months)	12.28	12.74	12.82	12.61*
(v)	Age at first kidding (months)	17.33	17.71	17.80	17.61*
(vi)	Gestation period (days)	143.37	142.14	145.73	143.75*
(vii)	Dry period (days)	53.00	52.71	49.88	51.86*
(viii)	Kidding rate				
	(a) Number of kiddings in two years	3	3	3	3*
	(b) Average number of kids per kidding	1.25	1.39	1.32	1.32*
	(c) Kidding interval (days)	199.4	202.3	203.0	201.9*
(ix)	Mortality (per cent)				
	(a) Adult goats	9	5	8	7.3*
	(b) Youngstocks	17	12	6	11.6*

* These are average figures of all categories of sheep and goat rearers.

For goats, the small, medium and large sized herds had 14, 29 and 57 goats, respectively, out of which 10, 21 and 43 were above one year of age and 4, 8 and 14

below one year in the respective categories. The average age at maturity and first kidding were 12.61 and 17.61 months while gestation and dry periods were about 144 and 52 days, respectively. Likewise, the sample goat farms had three kiddings in two years in all the categories while the average number of kids per kidding showed some variations, i.e., 1.25, 1.39 and 1.32 kids per kidding in small, medium and large categories, respectively. Moreover, the kidding interval varied between 199 and 203 days on the sample farms. Mortality in adult goats was 9, 5 and 8 per cent while it was 17, 12 and 6 per cent for young stocks in small, medium and large farms, respectively (Table 2).

High mortality in sheep and goats seems to be due to the lack of awareness among sheep and goat rearers about diseases/treatments, inadequate financial resources with them to meet out the health care services and/or treatments on the one hand, while inadequate disease diagnostic and disease surveillance services by the state government on the other. The economic traits for sheep and goats had not differed much across the categories of sample farms as, by and large, they reared non-descript breed. These findings are in conformity to those reported by Singh and Singh (1974).

(iii) *Costs and Returns from Sheep and Goat Rearing*

The sale of animals (sheep/goats) constituted the lion's share in the gross returns followed by sale of wool/milk. The average gross returns from sheep were Rs. 31,657 while from goats it was about Rs. 18,479. Moreover, the average gross returns on various groups of sheep and goat farms mainly varied due to variations in their flock sizes, lambing/kidding and mortality rates. The cost of sheep and goat rearing included feed, fodder, concentrates, medicines, interest on variable expenses, imputed value of family labour engaged in sheep and goat enterprises, depreciation on fencing/shed, the interest on fixed capital investment in sheep and goat. Moreover, no cash expenditure was incurred on leaves and grasses which were grazed in the open fields. The annual average total cost per sheep farm was worked out to be Rs. 26,674 while on goat farm it was Rs. 12,169. These costs also varied across categories due to variations in their flock sizes. The cost on labour was the major component which accounted for about 64 and 73 per cent of the total cost on the sampled sheep and goat farms, respectively (Table 3).

The average net returns from sheep and goat rearing were Rs. 4,983 and Rs. 6,310, respectively. However, the returns over variable cost were Rs. 29,043 and Rs.16,605, respectively. The average annual man-days of labour were worked out to be 643 and 510 on sheep and goat farms, respectively. The annual returns per manday of labour worked out to be Rs. 34.42 and Rs. 27.70 on the overall sheep and goat farms, respectively. The large flock sized farms had a better opportunity for the gainful employment of their available family labour.

TABLE 3. THE COSTS AND RETURNS FROM SAMPLE SHEEP AND GOAT FARMS IN SEMI-ARID REGION OF HARYANA (2001-2002)

Sr.No.	Particulars	Sheep				Goat			
		Small	Medium	Large	Overall average	Small	Medium	Large	Overall average
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Number of animals/herd	32	62	124	76	14	29	57	33
I.	Returns (Rs.)								
1.	Wool/milk	2,298	4,614	9,875	5,596	1,052	2,712	6,872	3,545
		(16.82)	(17.09)	(18.18)	(17.68)	(14.03)	(17.11)	(21.42)	(19.18)
2.	Animal sale (sheep/goats)	10,415	20,742	40,852	24,003	5,945	12,275	23,519	13,913
		(76.24)	(76.81)	(75.22)	(75.82)	(79.30)	(77.44)	(73.28)	(75.30)
3.	Manures	947	1,648	3,578	2,058	500	863	1,700	1,021
		(6.94)	(6.10)	(6.60)	(6.50)	(6.67)	(5.45)	(5.30)	(5.52)
4.	Total gross returns (1+2+3)	13,660	27,004	54,305	31,657	7,497	15,850	32,091	18,479
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
II	Costs (Rs.)								
a)	Fixed costs								
5.	Imputed value of family labour	8,200	15,095	28,155	17,150	4,900	7,500	14,100	8,833
		(67.37)	(64.41)	(63.38)	(64.32)	(78.31)	(71.98)	(71.09)	(72.58)
6.	Depreciation on shed @ 5 per cent	75	142	212	143	50	80	170	100
		(0.61)	(0.60)	(0.48)	(0.53)	(0.80)	(0.77)	(0.86)	(0.82)
7.	Interest on fixed capital investment @ 10 per cent	2,790	5,995	11,515	6,767	652	1,185	2,250	1,362
		(22.92)	(25.58)	(26.00)	(25.34)	(10.42)	(11.37)	(11.47)	(11.20)
8.	Total fixed costs (5+6+7)	11,065	21,232	39,882	24,060	5,602	8,765	16,520	10,295
		(90.90)	(90.60)	(89.79)	(90.20)	(89.53)	(84.12)	(83.30)	(84.60)
b)	Variable Costs								
9.	Feed, fodder and concentrates	795	1,650	3,690	2,045	418	1,200	2,449	1,355
		(6.53)	(7.04)	(8.30)	(7.66)	(6.68)	(11.51)	(12.34)	(11.13)
10.	Medicines	190	324	495	336	153	310	545	336
		(1.56)	(1.38)	(1.11)	(1.26)	(2.44)	(2.98)	(2.74)	(2.77)
11.	Interest on variable expenses @ 12 per cent per annum	120	230	350	233	84	145	320	183
		(0.99)	(0.98)	(0.79)	(0.87)	(1.34)	(1.39)	(1.62)	(1.50)
12.	Total variable costs (9+10+11)	1,105	2,204	4,535	2,614	655	1,655	3,314	1,874
		(9.08)	(9.40)	(10.21)	(9.80)	(10.47)	(15.88)	(16.70)	(15.40)
13.	Total costs (8+12)	12,170	23,436	44,417	26,674	6,257	10,420	19,834	12,169
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
14.	Returns over variable costs (4-12)	12,555	24,800	49,770	29,043	6,842	14,195	28,777	16,605
		(55.13) *	(54.16) *	(53.76) *	(54.30) *	(44.28)*	(44.14) *	(42.80)*	(42.95)*
15.	Net returns (4-13)	1,490	3,568	9,888	4,983	1,240	5,430	12,257	6,310
16.	Returns to labour and management (5+15)	9,690	18,663	38,043	22,133	6,140	12930	26357	15,143
17.	Total annual labour used (mandays)	525	618	787	643	323	497	710	510
18.	Returns per manday of labour used	18.45	30.20	48.34	34.42	19.00	26.00	37.12	27.70

Note: Figures in parentheses are respective percentages to total costs and returns.

These are number of sheep and goats which can earn an annual household income of Rs. 21,610 for a family of five member, to cross the poverty line and become a viable rearer, as per 1999-2000 estimates of the Planning Commission, Government of India.

The goat rearing was relatively more profitable than sheep rearing merely due to the greater number of kids born per goat on an average than lambs born per sheep, and the greater value of output per goat from milk and meat than the value of wool and mutton per sheep. Accordingly, there appears relatively greater scope for improving the local breeds/exotic breeds from outside for cross breeding. These findings are in conformity to those reported by Pandey (1992), Rath (1992), Parthipan (1994), Deoghare and Khan (1998), Pandey *et al.*, (1999) and Singh (2002). Thus, sheep and goat rearing seems to be a feasible proposition in the state.

Based on per sheep and goat returns over variable costs, the optimum herd size was also worked out which could earn an annual household income of Rs. 21610 for a family of five members to cross the poverty line, as per 1999-2000 estimates of the Planning Commission (Ruddardutt and Sundaram, 2003). Thus, viable sheep units ranged between 54 and 55 across categories while the same for goats were between 43 and 44. On the whole, 54 and 43 units of sheep and goats, constituted the respective viable herd sizes which can uplift the sheep and goat rearers above the poverty line (Table 3). Indeed, District Rural Development Agency in the state may consider these sizes/units while disbursing/granting loans and subsidies to the sheep and goat farmers.

The data about average wool and milk production on sample farms are contained in Table 4. Average wool yield per sheep on sample farms was 1.59 kilograms and it was the highest on medium farms followed by the small farms. Likewise, the average milk yield was 1.08 litres/day and it varied between 1.04 and 1.11 litres across categories. On an average the goats were in milk for 132 days and it ranged between 129 and 136 days across categories. Moreover, the milk yield of goats declined as stage of lactation prolonged after kidding.

TABLE 4. AVERAGE WOOL AND MILK PRODUCTION ON SAMPLE FARMS OF SEMI-ARID REGION IN HARYANA (2001-2002)

Particulars (1)	Small (2)	Medium (3)	Large (4)	Overall average (5)
A. Sheep				
Average wool yield/sheep/year (kilogram)				
Rams	2.92	2.71	2.28	2.64
Ewes	1.74	1.69	1.61	1.68
Lambs	0.97	1.27	1.16	1.13
Average annual yield/sheep	1.60	1.63	1.57	1.59
B. Goats				
Average yield in litre/day	1.04	1.10	1.11	1.08
Number of days in milk	129	132	136	132
Average yield after kidding (litres)				
First month	1.19	1.31	1.58	1.36
Second month	1.12	1.19	1.17	1.16
Third month	1.07	1.03	1.10	1.06
Fourth month	0.96	1.00	0.92	0.96
Fifth month	0.88	0.97	0.78	0.87

II. DISPOSAL PATTERN AND MARKETING COSTS AND MARGINS IN TRADING OF LIVE ANIMALS (SHEEP AND GOATS)

(1) *Disposal Patterns*

The small sheep rearers, out of 793 live animals sold as many as 277 (34.93 per cent) animals through channel-IV (Farmers-Village middlemen-Local trader - Wholesaler), followed by 217 (27.36 per cent) through channel-I (Farmer-Farmer), 151 (19.04 per cent) through channel-III (Farmer-Village middlemen-Wholesaler), 93 (11.73 per cent) through channel-V (Farmer-Village middlemen-Butcher) and only 55 (6.93 per cent) through channel-II (Farmer-Butcher). The medium sheep rearers sold 147 (28.10 per cent) through channel-I, 134 (25.62 per cent) through channel-IV, 118 (22.56 per cent) through channel-III, 87 (16.63 per cent) through channel-V and 37 (7.07 per cent) through channel-II. Likewise, large category sheep rearers out of total 426 live animals sold, 178 (41.78 per cent) through channel-III, 122 (28.64 per cent) through channel-I, 108 (25.35 per cent) through channel-IV and 18 (4.23 per cent) through channel-II. The channel-V was not adopted by large category sheep rearers as they sold their animals in bulk rather than in retail. On the whole, the maximum number of animals, i.e., 519 live animals (29.80 per cent) were sold through channel-IV, followed by channel-I 486 (27.90 per cent), channel-III 447 (25.66 per cent), channel-V 180 (10.33 per cent) and channel-II 110 (6.31 per cent). Furthermore, the channel-IV, i.e., Farmers-Village middlemen-Local trader-Wholesaler was preferred by all the three categories of sheep rearers, as it was the most popular and regularised channel among all the channels in the study area (Table 5).

Out of 451 live goats in the small category of goat rearers, 144 (31.93 per cent) were sold through channel-I (Farmer-Farmer), 108 (23.95 per cent) through channel-IV (Farmer-Village middlemen-Local trader-Wholesaler), 79 (17.51 per cent) through channel-II (Farmer-Butcher), 76 (16.85 per cent) through channel-III (Farmer-Village middlemen-Wholesaler) and only 44 (9.76 per cent) through channel-V (Farmer-Village middlemen-Butcher). The medium category goat rearers sold 104 (32.70 per cent) through channel-IV followed by 102 (32.08 per cent) through channel-III, 55 (17.30 per cent) through channel-I, 36 (11.32 per cent) through channel-V and only 21 (6.6 per cent) through channel-II. The large herd sized goat rearers, out of 258 live animals 85 (32.94 per cent) sold through channel-III, followed by 65 (25.19 per cent) through channel-IV, 53 (20.54 per cent) through channel-II, 28 (10.85 per cent) through channel-V and 27 (10.47 per cent) were sold through channel-I. On the whole, of the total 1027 goats sold, the maximum number of 277 (26.97 per cent) goats were sold through channel-IV, followed by 263 (25.61 per cent) through channel-III, 226 (22 per cent) through channel-I, 153 (14.90 per cent) through channel-II and only 108 (10.52 per cent) through channel-V in order. Again, the channel-IV seems to be the most preferred and regularised channel of the goat rearers (Table 5).

TABLE 5. CATEGORYWISE DISPOSAL PATTERN OF SHEEP AND GOATS (LIVE ANIMALS) THROUGH DIFFERENT MARKETING CHANNELS IN SEMI-ARID REGION OF HARYANA

Sr. No.	Marketing channels	Sheep				Goats			
		Small	Medium	Large	Total	Small	Medium	Large	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
I.	Farmer-farmer								
	(i) Number of farmers	25	11	5	41	28	8	3	39
		(37.78)	(32.35)	(29.41)	(35.04)	(42.42)	(25.80)	(18.75)	(34.51)
	(i) Number of animals sold	217	147	122	486	144	55	27	226
		(27.36)*	(28.10)*	(28.64)*	(27.90)*	(31.93)*	(17.30)*	(10.47)*	(22.00)*
II.	Farmer-butcher								
	(i) Number of farmers	4	3	1	8	11	3	4	18
		(6.06)	(8.82)	(5.89)	(6.83)	(16.67)	(9.68)	(25.00)	(15.92)
	(ii) Number of animals sold	55	37	18	110	79	21	53	153
		(6.93)*	(7.07)*	(4.23)*	(6.31)*	(17.51)*	(6.60)*	(20.54)*	(14.90)*
III.	Farmer-village middlemen-Wholesaler								
	(i) Number of farmers	8	7	6	21	7	8	3	18
		(12.12)	(20.60)	(35.29)	(17.95)	(10.60)	(25.80)	(18.75)	(15.93)
	(ii) Number of animals sold	151	118	178	447	76	102	85	263
		(19.04)*	(22.56)*	(41.78)*	(25.66)*	(16.85)*	(32.08)*	(32.94)*	(25.61)*
IV.	Farmer-Village middlemen -Local trader-Wholesaler								
	(i) Number of farmers	22	8	5	35	12	9	4	25
		(33.33)	(23.53)	(29.41)	(29.91)	(18.18)	(29.03)	(25.00)	(22.12)
	(ii) Number of animals sold	277	134	108	519	108	104	65	277
		(34.93)*	(25.62)*	(25.35)*	(29.80)*	(23.95)*	(32.70)*	(25.19)*	(26.97)*
V.	Farmer-Village middlemen-Butcher								
	(i) Number of farmers	7	5	-	12	8	3	2	13
		(10.61)	(14.70)		(10.26)	(12.12)	(9.68)	(12.50)	(11.50)
	(ii) Number of animals sold	93	87	-	180	44	36	28	108
VI.	Overall	(11.73)*	(16.63)*		(10.33)*	(9.76)*	(11.32)*	(10.85)*	(10.52)*
	(i) Number of farmers	66	34	17	117	66	31	16	113
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
	(ii) Number of animals sold	793	523	426	1742	451	318	258	1027
		(100.00)*	(100.00)*	(100.00)*	(100.00)*	(100.00)*	(100.00)*	(100.00)*	(100.00)*

Figures in parentheses are percentages to total number of farmers.
Figures in ()* are percentages to total number of animals sold.

(ii) *Marketing Costs and Margins*

Table 6 contains the data about marketing costs incurred by different categories of sheep and goats rearers. It is evident from the table that transportation and commission charges were the major marketing costs on all the categories of sheep and goat rearers, though transportation charges were relatively low in case of large rearers as compared to other categories. On an average per sheep loading and unloading charges were Rs. 1.27 (6.03 per cent), Rs. 6.82 (32.38 per cent) for transportation, Rs. 8.47 (40.22 per cent) for commission and Rs. 4.50 (21.37 per cent) as a miscellaneous cost. Likewise, on an average per goat Rs. 1.37 (6.37 per cent) costs for loading and unloading, Rs. 6.65 (30.93 per cent) for transportation, Rs. 9.05 (42.09 per cent) as commission and Rs. 4.43 (20.60 per cent) as miscellaneous charges. Moreover, the large sized sheep and goat farmers had the lowest commission charges per animal because a substantial quantity of their animals was disposed off through wholesale market. But the lowest loading and unloading as well as transportation charges on these farms were due to economies of scale. The commission charges were maximum on medium herd sized sheep and goat farms (Rs. 8.95 and Rs. 9.25/animal) followed by small farms (Rs. 8.70 and Rs. 9.10/animal).

TABLE 6.MARKETING COSTS INCURRED ON LIVE ANIMALS (SHEEP AND GOAT) BY DIFFERENT CATEGORIES OF FARMERS IN SEMI-ARID REGION OF HARYANA

(Rs./animal)

Sr. No.	Particulars	Categories							
		Sheep				Goat			
		Small	Medium	Large	Overall average	Small	Medium	Large	Overall average
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1.	Loading and Unloading	1.60 (6.74)	1.20 (5.66)	1.00 (5.50)	1.27 (6.03)	1.80 (7.73)	1.30 (5.96)	1.00 (5.15)	1.37 (6.37)
2.	Transportation	8.20 (34.53)	6.45 (30.42)	5.80 (31.87)	6.82 (32.38)	7.50 (32.19)	6.75 (30.96)	5.70 (29.38)	6.65 (30.93)
3.	Commission	8.70 (36.63)	8.95 (42.22)	7.75 (42.58)	8.47 (40.22)	9.10 (39.05)	9.25 (42.43)	8.80 (45.36)	9.05 (42.09)
4.	Miscellaneous	5.25 (22.10)	4.60 (21.70)	3.65 (20.05)	4.50 (21.37)	4.90 (21.03)	4.50 (20.64)	3.90 (20.10)	4.43 (20.60)
5.	Total	23.75 (100.00)	21.20 (100.00)	18.20 (100.00)	21.06 (100.00)	23.30 (100.00)	1.80 (100.00)	19.40 (100.00)	21.50 (100.00)

Note: Figures in parentheses are the percentages to total marketing cost.

The marketing costs and margins under different marketing channels of live sheep are presented in Table 7. For live sheep, the share of rearers/farmers in consumer's rupee was lowest in Channel-IV (93.13 per cent) and the highest in Channel-II (98.43 per cent). When we consider the net price received by the farmers per animal, it was found that channel IV had the highest price (Rs. 675). Although the sheep rearers got lesser price per animal in Channel-V (Rs. 636) as compared to Channel-I (Rs. 644), Channel-II (Rs. 660) and Channel-III (Rs. 659), yet the farmer's share in consumer's rupee was lesser in Channel-IV as they disposed off maximum

quantity through this channel due to being most popular channel. The marketing cost of farmers among different channels was noticed to be the highest in channel-I (3.16 per cent) followed by Channel-III (3.00 per cent), channel-IV (2.73 per cent), Channel-V (2.69 per cent) and lowest in Channel-II (1.57 per cent). The consumers purchased sheep through channels I, II III, IV, V and paid Rs. 665, Rs. 670, Rs. 700, Rs. 725 and Rs. 680 per animal, respectively.

Likewise, the marketing costs and margins of live goats under different marketing channels are presented in Table 8. For live goat, the share of rearers/farmers in consumer's rupee was the net lowest in channel-IV (92.40 per cent) and the highest in channel-I (97.49 per cent). When we consider the price received by the farmers per animal it was found that channel-I had the highest price (Rs. 756). Although the goat rearers got lesser price per animal in Channel-V (Rs. 736) and channel-II (Rs. 729) as compared to Channel-IV (Rs. 749), Channel-III (Rs. 739) and Channel-I (Rs. 776), yet farmer's share in consumer's rupee was the highest in Channel-I (Rs. 97.49 per cent), as they disposed off maximum quantity through this channel due to it being the most popular channel. As regards the marketing cost of farmers among different channels, it was found the highest in channel-II (2.86 per cent) followed by Channel-III (2.76 per cent), Channel-IV (2.66 per cent), Channel-I (2.51 per cent) and lowest in Channel-V (1.86 per cent). The consumers purchased goat through channels I, II, III, IV, V, and paid Rs. 775, Rs. 750, Rs. 780, Rs. 810 and Rs. 780 per animal, respectively.

III. EFFECT OF QUALITATIVE AND QUANTITATIVE FACTORS ON MARKET PRICES OF SHEEP AND GOATS

An attempt has been made to establish the cause and effect relationships between both qualitative as well as quantitative factors and the market prices of ewe, ram, lactating and dry pregnant goats and buck. Both quadratic and linear regression equations containing qualitative and quantitative characters of ewe, ram, lactating and dry pregnant goats and buck, respectively, were separately fitted. But linear regression equations were found to be the best fit and finally these were retained, keeping in view the coefficient of multiple determination, statistical significance of regression coefficients together with their size and sign.

(i) *Female Sheep (ewe)*:

To establish the relationship between the market price of ewe with both quantitative and qualitative characters, the multiple linear regression equation, as specified by equation 1, was fitted and the results obtained are as under:

$$Y = 530.7593 - \underset{(1.6579)}{69.3514}\, X^*_1 + \underset{(0.0547)}{0.4280}\, X^*_2 - \underset{(7.8010)}{1.1110}\, X_3 + \underset{(1.5375)}{6.8705}\, X^*_4 + \underset{(26.1082)}{68.9631}\, X^*_5 - \underset{(0.4508)}{0.4817}\, X_6 - \underset{(21.2884)}{16.4709}\, X_7 - \underset{(31.0452)}{37.7879}\, X_8 + \underset{(17.9826)}{19.1709}\, X_9 \quad \ldots (6)$$

$n = 25 \quad R^2 = 0.6254^*$

$F = 3.711$

Figures in parentheses are the standard errors of respective regression coefficients.

* Significant at 5 per cent probability level.

TABLE 7. MARKETING COSTS AND MARGINS OF LIVE SHEEP SOLD THROUGH DIFFERENT MARKETING CHANNELS IN SEMI-ARID REGION OF HARYANA

(Rs.)

Sr. No.	Particulars	I	II	III	IV	V
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	Price received by farmers	665 (100.00)	670 (100.00)	680 (97.14)	695 (95.86)	650 (95.58)
2.	Marketing cost incurred by the farmers					
	(a) Loading and unloading	1.27 (0.19)	-	1.27 (0.18)	-	1.27 (0.18)
	(b) Transportation	6.82 (1.02)	6.00 (0.90)	6.82 (0.97)	6.82 (0.44)	-
	(c) Commission	8.47 (1.27)	-	8.47 (1.21)	8.47 (1.17)	8.47 (1.24)
	(d) Miscellaneous	4.50 (0.68)	4.50 (0.67)	4.50 (0.64)	4.50 (0.62)	4.50 (0.66)
	Total (a to d)	21.06 (3.16)	10.50 (1.57)	21.06 (3.00)	19.79 (2.73)	14.24 (2.69)
3.	Net price received by the farmers	643.94 (96.83)*	659.50 (98.43)*	658.94 (94.14)*	675.21 (93.13)*	635.76 (93.49)*
4.	Price received by village middlemen	-	-	700.00 (100.00)	705 (97.24)	680 (100.00)
5.	Marketing cost incurred by village middlemen	-	-	-	-	-
	(a) Loading and unloading	-	-	1.27 (0.18)	1.27 (0.17)	1.27 (0.18)
	(b) Transportation	-	-	6.82 (0.97)		6.82 (1.00)
	(c) Commission	-	-	-	-	-
	(d) Miscellaneous	-	-	1.50 (0.22)	4.50 (0.62)	4.50 (0.66)
	Total (a to d)	-	-	9.59 (1.37)	5.77 (0.79)	12.59 (1.85)
6.	Price paid by village middlemen	-	-	680.00 (97.14)	695.00 (95.86)	650.00 (95.59)
7.	Net margin of village middlemen	-	-	10.41 (1.48)	4.23 (0.58)	17.31 (2.55)
8.	Price received by local trader	-	-	-	725 (100.00)	-
9.	Marketing cost incurred by local trader	-	-	-		-
	(a) Loading and unloading	-	-	-	1.27 (0.17)	-
	(b) Transportation	-	-	-	6.82 (0.94)	-
	(c) Commission	-	-	-	4.50 (0.62)	-
	Total (a to c)				12.59 (1.74)	
10.	Price paid by local trader	-	-	-	705.00 (97.24)	-
11.	Net margin of local trader	-	-	-	7.31 (1.00)	-
12.	Price paid by consumer	665 (100.00)	670 (100.00)	700 (100.00)	725 (100.00)	680 (100.00)

Note: Figures in parentheses are percentages to the price paid by the consumer,

* These are the producer's share in consumer's rupee.

TABLE 8. MARKETING COSTS AND MARGINS OF LIVE GOAT SOLD THROUGH DIFFERENT MARKETING CHANNELS IN SEMI-ARID REGION OF HARYANA

(Rs.)

Sr. No.	Particulars	I	II	III	IV	V
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	Price received by farmers	775 (100.00)	750 (100.00)	760 (97.43)	770 (95.06)	750 (96.15)
2.	Marketing cost incurred by the farmers					
	a) Loading and Unloading	-	1.37 (0.17)	1.37 (0.18)	1.37 (0.17)	1.00 (0.13)
	b) Transportation	5.00 (0.64)	6.65 (0.88)	6.65 (0.85)	6.65 (0.82)	-
	c) Commission	10.00 (1.29)	9.05 (1.22)	9.05 (1.16)	9.05 (1.12)	9.05 (1.16)
	d) Miscellaneous	4.43 (0.58)	4.43 (0.59)	4.43 (0.57)	4.43 (0.55)	4.43 (0.57)
	Total (a to d)	19.43 (2.51)	21.50 (2.86)	21.50 (2.76)	21.50 (2.66)	14.48 (1.86)
3.	Net price received by the farmers	755.57 (97.49)*	728.50 (97.13)*	738.50 (94.65)*	748.50 (92.40)*	735.52 (94.29)*
4.	Price received by village middlemen	-	-	780 (100.00)	785.00 (96.91)	780.00 (100.00)
5.	Marketing cost incurred by village middlemen	-	-	-	-	-
	a) Loading and Unloading	-	-	-	1.00 (0.12)	1.00 (0.13)
	b) Transportation	-	-	6.65 (0.85)	6.00 (0.74)	10.00 (1.28)
	c) Commission	-	-	-	-	-
	d) Miscellaneous	-	-	4.43 (0.57)	2.00 (0.25)	4.43 (0.57)
	Total (a to d)	-	-	11.08 (1.42)	9.00 (1.11)	15.43 (1.98)
6.	Price paid by village middlemen	-	-	760.00 (97.43)	770.00 (95.06)	750.00 (96.15)
7.	Net margin of village middlemen	-	-	8.92 (1.15)	6.00 (0.74)	14.57 (1.87)
8.	Price received by local trader	-	-	-	810 (100.00)	-
9.	Marketing cost incurred by local trader	-	-	-	-	-
	a) Loading and Unloading	-	-	-	1.50 (0.18)	-
	b) Transportation	-	-	-	6.00 (0.74)	-
	c) Commission	-	-	-	1.00 (0.13)	-
	d) Miscellaneous	-	-	-	2.50 (0.30)	
	Total (a to d)	-	-	-	11.00 (1.35)	-
10.	Price paid by local trader	-	-	-	785.00 (96.91)	-
11.	Net margin of local trader	-	-	-	14.00 (1.73)	-
12.	Price paid by consumer	775 (100.00)	750 (100.00)	780 (100.00)	810 (100.00)	780 (100.00)

Note: Figures in parentheses are percentages to the price paid by the consumer; These are the producer's share in consumer's rupee.

The significant value of coefficient of multiple determination indicated that all the variables included in the regression equation 6 could explain 62.54 per cent variation in the market price of ewe and the fitted model also adequately characterised the data. The characters such as age of ewe, wool yield, breed and prolificacy performance were found to be significant, i.e., effective in determining the market price of ewe. The negative sign for age implied that with an increase in age by one year the market price of ewe would decline by Rs. 69.35. Moreover, the wool yield, breed and prolificacy performance had established positive relationships with that of the market price of ewe. Thus, with an increase in wool yield by one gm, the descript breed and an increase in lambing rate by one lamb, the market price of ewe would increase by Rs. 0.43, Rs. 6.87 and Rs. 68.96, respectively. All other variables had established non-significant relationships with the market price of ewe. Hence, the extension advisory services should advise the farmers to keep these factors in mind while marketing their ewes in the region.

(ii) *Male Sheep (Ram):*

To establish the relationship between the market price of ram with both quantitative and qualitative characters, the multiple linear regression equation, as specified by equation 2, was fitted and the results obtained are as under:

$$Y = 914.6524 - \underset{(7\,0401)}{21.6693}\, X^*_1 - \underset{(7.2327)}{7.5021}\, X_2 + \underset{(.0740)}{.1607}\, X^*_3 - \underset{(30.6463)}{4.7534}\, X_4 + \underset{(18.0119)}{19.7656}\, X_5 + \underset{(8.2815)}{19.4666}\, X^*_6 + \underset{(11.5519)}{30.9877}\, X^*_7 - \underset{(9.5925)}{24.5226}\, X^*_8 \quad \ldots (7)$$

$n = 30 \quad R^2 = 0.6601^* \quad F = 13.8841$

Figures in parentheses are the standard errors of respective regression coefficients.
* Significant at 5 per cent probability level.

The coefficient of multiple determination was 0.6601 and also significant. It implied that all the variables included in the regression equation 7 could explain about 66 percent variation into the market price of ram and the fitted regression equation also adequately characterised the data. The regression coefficients for the age of ram and season of sale/ purchase were negative and significant while for those of wool yield, general appearance and quality of wool were positive and significant. Thus, with the advancement of ram's age by one year and poor (off) season of sale/purchase the market price declined by Rs. 21.67 and Rs. 24.52, respectively. On the contrary, one gram increase in wool yield, with good general appearance and fine (good) quality of wool had enhanced the market prices for ram by Rs. 0.16, Rs. 19.47 and Rs. 30.99, respectively. The policy implication of these findings is that concerted efforts should be made in the region by the livestock development officers to educate the farmers about these factors while marketing their rams.

(iii) *Lactating Goats:*

To establish the relationship between market price of lactating goats with both quantitative and qualitative characters, the multiple linear regression equation, as specified by equation 3, was fitted and the results obtained are as under:

$$Y = 61.3105 + 0.6191\ X^*_1 + 0.3602\ X_2 - 8.0158\ X_3 + 5.6421\ X_4 - 5.3422\ X_5 + 4.8588\ X_6 + 57.2275\ X^*_7$$
$$(0.1373) \quad (21.7074) \quad (12.2340) \quad (5.6798) \quad (24.2250) \quad (26.8026) \quad (20.4835)$$

$$+0.1615\ X_8 + 2.8019\ X_9 + 19.1634\ X^*_{10} + 58.4674 X^*_{11} - 5.5839\ X_{12} - 14.3936\ X_{13} \quad \ldots\ldots (8)$$
$$(1.2734) \quad (3.9596) \quad (2.4851) \quad (23.7377) \quad (12.5215) \quad (19.7948)$$

$n = 31$ $R^2 = 0.7293^*$

$F = 13.52$

Figures in parentheses are the standard errors of respective regression coefficients.

* Significant at 5 per cent probability level.

The coefficient of multiple determination was 0.7293 and also found to be significant. Accordingly, all the variables included in the regression equation 8 could explain about 73 per cent variation into the market price of lactating goats and the fitted regression equation also adequately characterised the data. The variables such as milk yield, general appearance, prolificacy performance and season of sale/purchase were positive and significant. Thus, a unit increase in these variables could increase the market price of lactating goats to the extent of their respective regression coefficients. Therefore, the concerted efforts should be made by the extension advisory services to educate the goat farmers of the region to keep these factors in mind while marketing their lactating goats to fetch remunerative prices.

(iv) *Dry Pregnant Goats:*

To establish the relationship between the market price of dry pregnant goats with both quantitative and qualitative characters the multiple linear regression equation, as specified by equation 4, was fitted and the results obtained are as under:

$$Y = 278.1020 + 36.7777\ X^*_1 - 39.4023\ X^*_2 + 12.6111\ X_3 - 3.3499\ X_4 + 34.3566\ X_5 + 36.9709\ X^*_6$$
$$(11.7397) \quad (16.8157) \quad (10.6579) \quad (28.0715) \quad (30.8381) \quad (17.4371)$$
$$+42.8764\ X^*_7 + 6.9377\ X^*_8$$
$$(14.3808) \quad (1.8496) \quad \ldots\ldots (9)$$

$n = 25$ $R^2 = 0.6892^*$

$F = 12.4396$

Figures in parentheses are the standard errors of respective regression coefficients.

* Significant at 5 per cent probability level.

For dry pregnant goats, the coefficient of multiple determination was 0.6892 and significant. Thus, all the variables included in the regression equation 9 could explain about 69 per cent variation into the market price of dry pregnant goats and the fitted regression equation also adequately characterised the data. The variables such as stage of pregnancy, attachment and placement of udder, general appearance and

season of sale/purchase though had positive and significant relationships yet the age of dry pregnant goats as negative and significant with their market price. Hence, the characters such as advanced stage of pregnancy, good attachment and placement of udder, general appearance and season of sale/purchase would fetch premiums in to the market price of dry pregnant goats to the extent of their respective regression coefficients. Yet, the advancement in age of dry pregnant goats by one year would discount into their market prices by Rs. 39.40. Accordingly, the farmers in the region may be educated about these characters to keep in mind while marketing their dry pregnant goats.

(v) *Male Goat (Buck):*

To establish the relationship between the market price of male goat (buck) with both quantitative and qualitative characters, the multiple linear regression equation, as specified by equation 5, was fitted and the results obtained are as under:

$$Y = 523.0661 + 34.5628\ X_1 + 20.4632\ X^*_2 - 135.4234\ X_3 - 83.9517\ X^*_4 - 36.8329\ X^*_5 - 29.5720\ X_6 \quad \ldots (10)$$
$$(19.2118) \quad (6.1445) \quad (85.2011) \quad (37.7834) \quad (14.2521) \quad (32.4325)$$

$n = 22 \qquad R^2 = 0.6899^*$
$F = 15.5624$

Figures in parentheses are the standard errors of respective regression coefficients.

* Significant at 5 per cent probability level.

The coefficient of multiple determination for male goat, i.e, buck was significant. Accordingly, all the variables included in the regression equation 10 could explain about 69 per cent variation into the market price of buck and fitted regression equation also adequately characterised the data. The weight was positively and significantly related to their market price while those of breed and general appearance as negative and significant. It implied that one kilogram increase in the weight of buck would fetch premium in to their market price by Rs. 20.46 while non-descript breed and poor general appearance would discount by Rs. 83.95 and Rs. 36.83, respectively. Hence, concerted efforts are needed to educate the farmers by the extension advisory services of the region about these characters so that farmers may get remunerative prices for their buck.

CONCLUSIONS AND POLICY IMPLICATIONS

The analysis of data presented in the preceding section revealed that sheep and goat rearers possessed small and medium herds, were illiterate, landless, marginal and small farmers, practiced self rearing without having training from any institute, of traditional castes and poor people falling into the lower strata of the social system. Both the species had three lambings/kiddings in two years with one lamb and more than one kid, higher mortality in young stocks as well as non-differing bio-economic

traits across categories due to the rearing of non-descript breed. Although goat rearing was found relatively more profitable than sheep rearing yet, sheep and goat farming seems to be a sound proposition to uplift the rural poor above poverty line in the state.

The Channel-IV, i.e., Farmers-Village middlemen-Local trader-Wholesaler was preferred by all the categories of sheep and goat rearers, as it was the most popular and regularised channel among all the channels of the study area. Both transportation and commission charges were the major marketing costs on all the categories on sheep and goat rearers, though transportation charges were relatively low in the case of large herd sized rearers. Furthermore, the Channel-IV was found to be the most efficient one for trading of live sheep while Channel I (Farmer – Farmer) in the case of live goat.

Age of ewe established negative and significant relationship with their market price while wool yield, breed and prolificacy performance as positive and significant. Likewise, age of ram and season of sale/purchase had negative and significant but those of wool yield, general appearance and quality of wool as positive and significant relationship with their market price. For lactating goats, the variables such as milk yield, general appearance, prolificacy performance and season of sale/purchase were positively and significantly related with their market price. To dry pregnant goats, the variables such as stage of pregnancy, attachment and placement of udder, general appearance and season of sale/purchase though had positive and significant relationships yet the age of dry pregnant goats as negative and significant with their market price. The weight of buck was positively and significantly related to their market price while those of breed and general appearance as negative and significant.

The policy implications of these findings are that the concerted efforts may be made to educate the sheep and goat rearers for adoption of modern animal husbandry practices concerning these enterprises so as to improve the bio-economic traits and thereby economic earnings. The financial institutions should come forward to extend adequate loans to establish the viable units of these enterprises. The government may subsidise the loans, develop veterinary health care services and market infrastructure in the state.

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