



A study on economic traits, costs and returns of buffalo husbandry in Haryana

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ABSTRACT

The present study was taken up to study the economic traits of bovines i.e. buffalo, and to work out the cost and returns from buffalo milk production on different categories of herds in Hisar and Karnal. Buffalos are the main milch animals followed by the crossbred cattle to sustain the milk production needs in both districts. The age at first calving has considerable economic significance to the farmers because the cost of rearing heifer from birth to calving and consequently the milk yield are strongly influenced by this character. The average gestation period was almost same in both the selected district. On an average more than one service per conception was required. On an average duration of milk yield was 58 and 63 days in Hisar and Karnal district, respectively. The milk yield decreased with the increase in herd size in both the districts. As a result of economies of large size, labour cost decreased with increase in herd size in both the districts. The net maintenance cost per milch buffalo was highest in winter and lowest in rainy season on all the herd size groups. On an average the net profit of milk production of a buffalo per day was highest on small herd size group followed by medium and large size group in Hisar district. In Karnal district the net or gains per day was highest on small followed by large and medium herd size groups. The net profit per buffalo per day was higher in winter and lowest in summer in small herd size groups in Hisar district and on medium and large herd size groups in rainy season and lowest gain in summer. In Karnal district the trend was slightly different. The net return was highest in rainy season in all the herd size groups but lowest in summer in small, and in winter in medium and large herd size of groups. On an average about 48 and 58% of the total milk produced was sold as fresh milk in Hisar and Karnal district, respectively.

Key words: Cost and returns, Economic traits of bovines, Haryana, Herds, Milk production

The per capita availability of milk in Haryana was 660 g/day as against 245 g/day in the country in 2006–07. Among the farm animals buffaloes occupy the most pre-dominant place and constitute about 65.92%, of total livestock population in the state. Amongst the districts, Jind district occupies the first position with 8.0% of buffalo population in the State (Livestock Census 2007).

Taking into consideration the facts that the land is the most limiting factor to increase the level of income and employment on the majority of the farms in the country and livestock enterprises require comparatively less land and more labour than field crops, there is need to systematically develop livestock husbandry for the betterment of farmers. The livestock products have relatively higher income elasticity of demand. By assuring remunerative prices for

milk and milk products, expansion of dairy industry has a good future in the state. Increasing the income and employment opportunity of marginal and small farmers and landless agricultural labour house-holds through dairying is in conformity with the national objectives. Keeping the importance of livestock sector in the economy of the State, the present study was taken up to (i) study the economic traits of bovines i.e. buffalo, and (ii) to work out the cost and returns from buffalo milk production on different categories of herds in both the selected districts.

METHODOLOGY

The Hisar and Karnal districts of the State which form important tract for the famous Haryana breed of cattle and Murrah breed of buffaloes, and also dominate the livestock sector with higher concentration in livestock population and infrastructural development were selected purposively for this study. The multistage stratified random sampling technique was used for selection of the respondents. The selection of tehsils, cluster villages and dairy farmers formed the first, second and third stages of sampling, respectively.

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From amongst tehsils of these selected districts, one tehsil was selected randomly i.e. Karnal tehsil from amongst tehsils of Karnal district and Hisar tehsil from Hisar district. All the villages of these respective tehsils were enumerated and two cluster villages (each cluster with 2 village hamlets) were selected. Thus in total, 8 villages were selected. All the dairy farmers were classified into 3 categories based on number of milch animals reared by them, viz. small (1 to 2 milch animals), medium (3 to 5 milch animals) and large (more than 5 milch animals) by adopting the cumulative total method. Thus, in all 200 dairy farmers i.e. 82 small, 86 medium and 32 large farmers were selected. The data were collected for a period of one year (March 2007 to February 2008) for different seasons of the year i.e. summer, rainy and winter.

Cost of maintenance: To analyze costs and returns from milk production of buffalo maintenance cost of the animal was first estimated. The maintenance cost included cost of feeding, human labour, depreciation on fixed assets, interest on fixed capital and miscellaneous recurring expenditure. From this cost was subtracted income from dung. Depreciation on milch animals was calculated by straight line method based on the market value of the animals after five years of age. The milch buffaloes were assumed to appreciate during the age of 3 to 5 years. Depreciation on sheds was calculated for the whole year @ 2.5% for 'pucca' sheds and 5% for 'kaccha sheds'. Interest on fixed capital assets including the initial value of the animals was worked out at the rate of 8% per annum. For lactating animals no interest was charged on the working capital under the assumption that farmers can realize the income from the sale of milk as soon as he invests the money. The quantity of dung per animal was valued on the basis of prevailing rates in the locality. The milk yield of buffalo was estimated on the basis of actual milk produced by the buffalo after feeding the calves.

RESULT AND DISCUSSION

Economic traits (reproduction and production traits)

Reproduction traits: The age at first calving has considerable economic significance to the farmers because the cost of rearing heifer from birth to calving and

consequently the milk yield are strongly influenced by this character (Table 1). The age at first calving is governed by age of maturity, conception rate, gestation length, etc. By proper feeding and management, the age at first calving can be reduced and economy could be attained in rearing heifer from birth to calving. The average age at first calving of buffaloes in Hisar district was 48.14 months whereas in Karnal district it was 47.34 months. In Karnal district, average age at first calving was slightly less. The average gestation period was almost same in both the districts i.e. 305 in Hisar and 304 in Karnal. On an average more than one service per conception was required in both the study areas. The sample respondents were of the view that some animals required more than two services per conception, even in some cases the animals got conceived with three services.

Production traits: In Hisar district, average milk yield of buffaloes before reaching peak milk yield was 8.12 litres/day whereas in Karnal district it was slightly higher (Table 2). The milk yield before reaching peak level was highest on small herd size group followed by medium and large herd size groups. The same pattern was observed in Karnal district also. Buffaloes took on an average 42 days to reach peak milk yield in Hisar district and 41 days in Karnal district. Peak milk yield was estimated to be 10.50 litres/day in Hisar and 10.85 litres/day in Karnal district. On an average duration of peak milk yield was 58 and 63 days in Hisar and Karnal district, respectively.

There was slight decline in duration of peak milk yield with the increase in herd size. Duration of post peak milk yield was estimated about 196 days in Hisar district and 197 days in Karnal district. The average milk yield during lactation period was 7.24 litres/day in Hisar district and in Karnal 7.63 litres/day. The milk yield was decreased with the increase in herd size in both the districts.

Components of calving interval are the service period and the gestation period. The calving interval is of great significance to the farmers whose income is derived from the sale of milk and calves. The breeding efficiency of the buffaloes also depends to a large extent on this character. A lower calving interval is considered to be of great advantage to a farmer because a longer dry period will be expensive as the animal has to be fed and taken care of during this unproductive period. As a result, the fixed cost of milk production increases and profit margin decreases. The lactation period and milk production per lactation vary depending on the breed and management particularly the level of nutritive feeding. On an average buffaloes remained in milk for 296 days in Hisar district and 300 days in Karnal district (Table 2). The dry period was relatively more in Hisar district compared to Karnal district.

Costs and returns from buffaloes: The cost was divided into major groups, viz. variable and fixed costs. Variable costs include expenditure on green fodder, dry fodder, concentrates, human labour and miscellaneous expenses. Miscellaneous

Table 1. Economic aspects of reproduction traits of milch buffalo in Haryana

Reproduction traits	Hisar	Karnal
Age at first heat puberty (months)	37.44	36.88
Age at first service (months)	38.10	37.24
Normal estrous interval (days/hours)	21/30	21/28
Duration of service period (days)	86	88
Age at first calving (months)	48.14	47.34
Gestation period (days)	305	304
No of services per conception	1.8	1.30

Table 2. Economic aspects of production traits of buffalo in Haryana

Particulars	Hisar				Karnal			
	Small	Medium	Large	Overall	Small	Medium	Large	Overall
Days to reach peak milk yield	40.15	41.56	42.8	41.54	39.85	40.45	41.8	40.92
Av. Milk yield before reaching peak milk yield (litres/day)	8.2	8.1	8.1	8.12	8.55	8.35	8.2	8.32
Peak milk yield (litres/day)	10.6	10.5	10.4	10.50	10.92	10.82	10.85	10.85
Duration of peak milk yield (days)	60	58	58	58.42	65	63	62	62.94
Duration of post peak yield period (days)	196	197	195	196.34	195	197	197	196.63
Av. milk yield during post peak period (litres/day)	6.1	6.08	6.08	6.08	6.62	6.45	6.38	6.45
Av. Milk yield per lactation (litres/day)	7.30	7.23	7.22	7.24	7.81	7.62	7.55	7.63
Lactation period/length (days)	296.15	296.56	295.8	296.30	299.85	300.45	300.8	300.49
Dry period (days)	92	95	97	94.81	89	91	93	91.50
Inter calving period/calving interval (days)	388.15	391.56	392.8	391.11	388.85	391.45	393.8	391.99

expenditures incurred on maintaining animals include veterinary expenses, breeding expenses, the expenses incurred at the time of calving etc. Sometimes these expenses may be larger when an animal suffers from any disease or any other problem for a long duration. Fixed cost includes depreciation and interest on cattle sheds and store, dairy equipments and milch animals. The different components of maintenance cost and net returns per day per milch buffalo were calculated for different seasons for all the three herd size groups for both the study areas and are discussed here.

Per day maintenance cost of a buffalo i.e. total feeding cost of green fodder, dry fodder and concentrates constituted the most important items of the total maintenance cost accounting for 62 to 68% of the total cost in Hisar district and 61 to 67% in Karnal district. The total feeding cost per buffalo per day was highest in winter season followed by summer and rainy seasons on all the herd size groups in Hisar district. The same trend was noticed in case of total feeding cost in different seasons on all the herd size groups in Karnal district. It was further observed that the cost of feed and fodder per buffalo per day was higher on small and medium size groups as compared to large size group in all the three seasons in both the study areas. On an average labour cost accounted for about 14 to 17% of the total cost in Hisar and 14 to 16% in Karnal district. As a result of economies of large size, labour cost decreased with increase in herd size in both the districts.

In Hisar district, the interest on animals and other fixed capital per milch buffalo per day was highest on small size group (₹ 10.28) followed by medium (₹ 9.11) and large (₹ 7.95) size groups due to the economies of scale. Similar trend was observed in Karnal district in this regard. The interest on fixed capital in different seasons on all the herd size groups accounted for 8.85 to 10.91% of the total maintenance cost in Hisar district and 9.47 to 11.27% in Karnal district. Depreciation on assets and animals ranged from 4.40 to 6.06% of the total cost on different herd size groups in Hisar district and 4.15 to 6.28% in Karnal district.

The net maintenance cost per milch buffalo was highest in winter and lowest in rainy season on all the herd size groups in both the districts, because the cost of feeding is the main constituent of the total cost and the farmers fed more concentrates in winter to get maximum milk production. In the rainy season, more green fodder was fed, which was relatively cheaper and readily available, hence, the feeding cost was lowest in rainy season.

The average daily milk yield was estimated for milch animals by taking into account the dry period because the maintenance cost was estimated on the basis of maintenance cost of both dry and lactating animals during the specific period of study. The milk yield of buffalo in milk shows the average milk yield during the lactation period without considering the dry animals whereas that of a milch animal shows the average milk yield including both lactating and dry buffaloes. The daily milk yield of a milch buffalo was higher in winter followed by rainy and summer season on all the herd size groups in both the study areas (Tables 3,4). Further the average daily milk production or yield of a milch animal was highest on small size group and lowest on large size group in all the 3 seasons in both the districts. This may be due to the fact that the percentage of buffaloes in milk was highest on small size group and lowest on large size group and the time devoted by the farmers for care and maintenance of each animal was highest on small herd size group followed by medium and large herd size groups in both the study areas.

On an average the net profit of milk production of a buffalo per day was highest on small herd size group (₹ 20.18) followed by medium (₹ 18.64) and large size group (₹ 18.35) in Hisar district. In Karnal district the net or gains per day was highest on small (₹ 21.35) followed by large (₹ 20.39) and medium herd size group (₹ 20.16). The net profit per buffalo per day was higher in winter season and lowest in summer season in case of small herd size groups in Hisar district. However in medium and large herd size groups, net profit was highest in rainy season and again lowest in

Table 3. Season wise costs and returns from buffalo milk production on different categories of herds in Hisar District

		(₹/Animal/Day)															
Sr. No	Particulars	Small				Medium				Large				Overall			
		Winter	Summer	Rainy	Overall	Winter	Summer	Rainy	Overall	Winter	Summer	Rainy	Overall	Winter	Summer	Rainy	Overall
A	<i>Fixed Cost</i>																
(i)	Interest on fixed capital	10.28 (10.56)	10.28 (10.84)	10.28 (10.91)	10.28 (10.77)	9.11 (9.72)	9.11 (9.90)	9.11 (10.01)	9.11 (9.87)	7.95 (8.85)	7.95 (9.02)	7.95 (9.15)	7.95 (9.01)	9.11 (9.73)	9.11 (9.94)	9.11 (10.04)	9.11 (9.91)
(ii)	Depreciation on fixed assets	5.71 (5.87)	5.71 (6.02)	5.71 (6.06)	5.71 (5.98)	4.62 (4.93)	4.62 (5.02)	4.62 (5.08)	4.62 (5.01)	3.95 (4.40)	3.95 (4.48)	3.95 (4.54)	3.95 (4.47)	4.76 (5.08)	4.76 (5.19)	4.76 (5.25)	4.76 (5.17)
	Total Fixed Cost	15.99 (16.43)	15.99 (16.86)	15.99 (16.97)	15.99 (16.75)	13.73 (14.64)	13.73 (14.93)	13.73 (15.08)	13.73 (14.88)	11.90 (13.25)	11.90 (13.50)	11.90 (13.69)	11.90 (13.48)	13.87 (14.82)	13.87 (15.14)	13.87 (15.29)	13.87 (15.08)
B	<i>Variable costs</i>																
(i)	Green Fodder	24.35 (25.02)	22.60 (23.83)	26.10 (27.70)	24.35 (25.51)	24.30 (25.92)	22.55 (24.52)	25.8 (28.34)	24.22 (26.25)	24.20 (26.95)	22.40 (25.42)	26.10 (30.02)	24.23 (27.45)	24.28 (25.94)	22.52 (24.57)	26.00 (28.66)	24.27 (26.38)
(ii)	Dry Fodder	11.91 (12.24)	13.12 (13.84)	9.80 (10.40)	11.61 (12.16)	11.88 (12.67)	14.15 (15.38)	9.65 (10.60)	11.89 (12.89)	11.70 (13.03)	14.20 (16.11)	9.45 (10.87)	11.78 (13.35)	11.83 (12.63)	13.82 (15.08)	9.63 (10.62)	11.76 (12.79)
(iii)	Concentrate	25.36 (26.06)	23.33 (24.60)	22.20 (23.56)	23.63 (24.75)	25.60 (27.30)	23.45 (25.49)	23.50 (25.82)	24.18 (26.21)	25.30 (28.17)	23.10 (26.21)	22.60 (26.00)	23.67 (26.81)	25.42 (27.15)	23.29 (25.42)	22.77 (25.09)	23.83 (25.90)
(iv)	Human labour	15.18 (15.60)	15.24 (16.07)	15.59 (16.55)	15.34 (16.07)	14.05 (14.99)	13.90 (15.11)	14.15 (15.54)	14.03 (15.21)	12.80 (14.25)	12.62 (14.32)	12.98 (14.93)	12.80 (14.50)	14.01 (14.96)	13.92 (15.19)	14.24 (15.70)	14.06 (15.28)
(v)	Miscellaneous expenditure	4.54 (4.66)	4.54 (4.79)	4.54 (4.82)	4.54 (4.76)	4.20 (4.48)	4.20 (4.57)	4.20 (4.61)	4.20 (4.56)	3.90 (4.34)	3.90 (4.43)	3.90 (4.49)	3.90 (4.42)	4.21 (4.50)	4.21 (4.60)	4.21 (4.64)	4.21 (4.58)
	Total Variable cost	81.34 (83.57)	78.83 (83.14)	78.23 (83.03)	79.47 (83.25)	80.03 (85.36)	78.25 (85.07)	77.30 (84.92)	78.53 (85.12)	77.90 (86.75)	76.22 (86.50)	75.03 (86.31)	76.38 (86.52)	79.76 (85.18)	77.77 (84.86)	76.85 (84.71)	78.13 (84.92)
C	Total cost (A + B)	97.33 (100)	94.82 (100)	94.22 (100)	95.46 (100)	93.76 (100)	91.98 (100)	91.03 (100)	92.26 (100)	89.80 (100)	88.12 (100)	86.93 (100)	88.28 (100)	93.63 (100)	91.64 (100)	90.73 (100)	92.00 (100)
D	Value of dung	2.85	2.97	2.79	2.87	2.89	3.02	2.71	2.87	2.79	2.82	2.61	2.74	2.84	2.94	2.70	2.83
E	Net cost (C- D)	94.48	91.85	91.43	92.59	90.87	88.96	88.32	89.38	87.01	85.3	84.32	85.54	90.79	88.70	88.02	89.17
F	Milk production (litres)	6.77	5.92	6.2	6.30	6.4	5.72	5.97	6.03	6.15	5.52	5.72	5.80	6.44	5.72	5.96	6.04
G	Price of milk (₹/ litre)	17.21	18.51	18.1	17.94	17.2	18.5	18.12	17.94	17.22	18.5	18.12	17.95	17.21	18.50	18.11	17.94
H	Gross returns (F X G)	116.51	109.58	112.22	112.77	110.08	105.82	108.18	108.03	105.90	102.12	103.65	103.89	110.83	105.84	108.01	108.23
I	Net return (H-E)	22.03	17.73	20.79	20.18	19.21	16.86	19.86	18.64	18.89	16.82	19.33	18.35	20.04	17.14	19.99	19.06

Figures in the parentheses indicate percentages of the total cost.

Table 4. Season wise costs and returns from Buffalo milk production on different categories of herds in Karnal District

(₹/Animal/Day)

Sr. No	Particulars	Small				Medium				Large				Overall			
		Winter	Summer	Rainy	Overall	Winter	Summer	Rainy	Overall	Winter	Summer	Rainy	Overall	Winter	Summer	Rainy	Overall
A	<i>Fixed Cost</i>																
(i)	Interest on fixed capital	10.62 (10.69)	10.62 (11.15)	10.62 (11.27)	10.62 (11.03)	9.55 (10.05)	9.55 (10.21)	9.55 (10.64)	9.55 (10.30)	8.62 (9.47)	8.62 (9.82)	8.62 (9.92)	8.62 (9.73)	9.60 (10.00)	9.60 (10.41)	9.60 (10.63)	9.60 (10.37)
(ii)	Depreciation on fixed assets	5.92 (5.96)	5.92 (6.22)	5.92 (6.28)	5.92 (6.15)	4.75 (5.00)	4.75 (5.08)	4.75 (5.30)	4.75 (5.12)	3.78 (4.15)	3.78 (4.31)	3.78 (4.35)	3.78 (4.27)	4.82 (5.06)	4.82 (5.23)	4.82 (5.34)	4.82 (5.21)
	Total Fixed Cost	16.54 (16.64)	16.54 (17.37)	16.54 (17.55)	16.54 (17.18)	14.3 (15.05)	14.30 (15.28)	14.30 (15.95)	14.30 (15.42)	12.40 (13.62)	12.4 (14.13)	12.40 (14.27)	12.40 (14.00)	14.41 (15.15)	14.41 (15.64)	14.41 (15.96)	14.41 (15.58)
B	<i>Variable costs</i>																59.65 (64.46)
(i)	Green Fodder	26.68 (26.85)	23.1 (24.26)	27.35 (29.01)	25.71 (26.70)	26.75 (28.15)	23.90 (25.54)	27.10 (30.23)	26.92 (27.94)	25.85 (28.40)	22.15 (25.25)	27.05 (31.12)	25.02 (28.25)	26.43 (27.78)	23.05 (25.01)	27.17 (30.09)	25.55 (27.61)
(ii)	Dry Fodder	10.32 (10.39)	12.75 (13.39)	8.65 (9.18)	10.57 (10.98)	10.40 (10.94)	12.50 (13.36)	7.45 (8.31)	10.12 (10.91)	10.05 (11.04)	12.80 (14.59)	7.25 (8.34)	10.03 (11.33)	10.26 (10.78)	12.68 (13.76)	7.78 (8.62)	10.24 (11.07)
(iii)	Concentrate	26.12 (26.29)	23.25 (24.42)	21.85 (23.18)	23.74 (24.66)	25.25 (26.57)	24.50 (26.18)	22.30 (24.87)	24.02 (25.89)	25.5 (28.02)	23.15 (26.38)	22.80 (26.23)	23.82 (26.89)	25.62 (26.93)	23.63 (25.64)	22.32 (24.72)	23.86 (25.78)
(iv)	Human labour	15.23 (15.33)	15.10 (15.86)	15.40 (16.34)	15.24 (15.83)	14.10 (14.84)	14.15 (15.12)	14.28 (15.93)	14.18 (15.28)	13.10 (14.39)	13.12 (14.95)	13.30 (15.30)	13.17 (14.88)	14.14 (14.87)	14.12 (15.32)	14.33 (15.87)	14.20 (15.34)
(v)	Miscellaneous expenditure	4.48 (4.51)	4.48 (4.70)	4.48 (4.75)	4.48 (4.65)	4.23 (4.45)	4.23 (4.52)	4.23 (4.72)	4.23 (4.56)	4.12 (4.53)	4.12 (4.70)	4.12 (4.74)	4.12 (4.65)	4.28 (4.50)	4.28 (4.64)	4.28 (4.74)	4.28 (4.62)
	Total Variable cost	82.83 (83.36)	78.68 (82.63)	77.73 (82.45)	79.75 (82.82)	80.73 (84.95)	79.28 (84.72)	75.36 (84.05)	78.46 (84.58)	78.62 (86.38)	75.34 (85.87)	74.52 (85.73)	76.16 (86.00)	80.73 (84.85)	77.77 (84.36)	75.87 (84.04)	78.12 (84.42)
C	<i>Total cost (A + B)</i>	99.37 (100)	95.22 (100)	94.27 (100)	96.29 (100)	95.03 (100)	93.58 (100)	89.66 (100)	92.76 (100)	91.02 (100)	87.74 (100)	86.92 (100)	88.56 (100)	95.14 (100)	92.18 (100)	90.28 (100)	92.53 (100)
D	<i>Value of dung</i>	2.87	2.82	2.76	2.82	2.86	2.92	2.68	2.82	2.82	2.92	2.72	2.82	2.85	2.89	2.72	2.82
E	<i>Net cost (C- D)</i>	96.5	92.4	91.51	93.47	92.17	90.66	86.98	89.94	88.2	84.82	84.2	85.74	92.29	89.29	87.56	89.72
F	<i>Milk production (litres)</i>	6.9	6.15	6.4	6.48	6.45	6.01	6.25	6.24	6.25	5.8	6.02	6.02	6.53	5.99	6.22	6.25
G	<i>Price of milk (₹/ litre)</i>	17.1	18.25	17.85	17.73	17.08	18.2	17.72	17.67	17.05	18.15	17.7	17.63	17.08	18.20	17.76	17.68
H	<i>Gross returns (F × G)</i>	117.99	112.24	114.24	114.82	110.17	109.38	110.75	110.10	106.56	105.27	106.55	106.13	111.57	108.96	110.51	110.35
I	<i>Net return (H-E)</i>	21.49	19.84	22.73	21.35	18.00	18.72	23.77	20.16	18.36	20.45	22.35	20.39	19.28	19.67	22.95	20.63

Figures in the parentheses indicate percentages of the total.

Table 5. Production and disposal pattern of milk in the selected districts

(milk/day/household)

Herd size group	Hisar											
	Total milk production			Used as fresh			Milk converted into ghee			Sold as fresh		
	Cow	Buffalo	Total	Cow	Buffalo	Total	Cow	Buffalo	Total	Cow	Buffalo	Total
Small	1.24 (100.00)	7.72 (100.00)	8.96 (100.00)	0.70 (56.57)	3.25 (42.08)	3.95 (44.08)	0 (4.53)	0.35 (3.91)	0.35 (43.43)	0.54 (53.38)	4.12 (52.01)	4.66 (52.01)
Medium	2.24 (100.00)	14.50 (100.00)	16.74 (100.00)	0.70 (31.29)	5.50 (37.53)	6.209 (37.03)	0.22 (9.83)	3.10 (21.38)	2.32 (13.86)	1.32 (58.88)	5.90 (40.69)	8.22 (49.10)
Large	2.28 (100.00)	25.78 (100.00)	28.06 (100.00)	1.25 (54.74)	6.10 (23.66)	7.359 (26.19)	0.00 (19.98)	5.15 (18.35)	5.15 (45.26)	1.03 (56.36)	14.53 (55.45)	15.56 (55.45)
Average	1.86 (100.00)	13.18 (100.00)	15.04 (100.00)	0.76 (40.78)	4.72 (35.79)	5.48 (36.43)	0.11 (6.04)	2.29 (17.34)	2.40 (15.94)	0.99 (53.17)	6.18 (46.87)	7.17 (47.65)
Karnal												
Small	3.18 (100.00)	5.46 (100.00)	8.64 (100.00)	0.85 (26.73)	2.80 (51.28)	3.65 (42.25)	0.40 (12.58)	0.70 (12.82)	1.10 (12.73)	1.93 (60.69)	1.96 (35.90)	3.89 (45.02)
Medium	4.39 (100.00)	12.76 (100.00)	17.15 (100.00)	0.70 (15.95)	4.52 (35.42)	5.22 (30.44)	0 (8.86)	1.13 (6.59)	1.13 (84.05)	3.69 (58.72)	7.11 (62.97)	10.80 (62.97)
Large	7.04 (100.00)	26.43 (100.00)	33.47 (100.00)	1.25 (17.76)	5.90 (22.32)	7.15 (21.36)	1.45 (20.60)	4.35 (16.46)	5.80 (17.33)	4.34 (61.65)	16.18 (61.22)	20.52 (61.31)
Average	4.38 (100.00)	12.27 (100.00)	16.65 (100.00)	0.87 (19.89)	4.05 (32.97)	4.92 (29.53)	0.46 (10.39)	1.57 (12.81)	2.03 (12.17)	3.06 (69.72)	6.65 (54.22)	9.71 (58.30)

Figures in parentheses indicate percentage to total milk production.

summer. In Karnal district, the trend was slightly different. The net return was highest in rainy season in all the herd size groups, but lowest in summer season in small and in winter of medium and large herd size groups. It may be concluded the net profit or gain per buffalo per day was comparatively higher on small size group as compared to medium and large size groups in both the areas.

Production and disposal pattern of milk: The production and utilization pattern of milk on different categories of herd size groups is presented in Table 5. On an average, per day per household 15 litres milk was produced by the milch animals in Hisar district and 17 litres in Karnal district. The milk production ranged from 8.96 litres on small herd size group to 25.78 litres on large herd size group in Hisar district and 8.64 to 33.47 litres in Karnal district. The share of cow milk to total milk produced was more in Karnal district on all the categories of farms. On an average, out of the total milk produced about 12% was from cows in Hisar district in Karnal district and 26%. In Hisar district, about 41% of cow milk produced was used as fresh milk by the sample households, 6% milk produced was converted into ghee and the remaining about 53% was sold as fresh milk. In Karnal, district, the corresponding figures were 20, 10 and 70% respectively. In case of buffalo milk in Hisar district about 36% of the total milk produced was used as fresh milk by the producers themselves whereas this figure in Karnal district was slightly less (33%). The percentage of milk used for making ghee was also less in Karnal district compared to Hisar district. In Hisar district about

17% of the buffalo milk was used for ghee whereas in Karnal district 13% milk produced was used for this purpose. It indicates that percentage of milk produced retained was relatively more in Hisar district compared to Karnal district. Obviously percent of total milk produced used as fresh milk decreased with the increase in herd size. On an average, about 48 and 58% of the total milk produced was sold as fresh milk in Hisar and Karnal district, respectively.

The following conclusions were emerged from the results summarized in preceding sections:

1. Buffaloes are the main milch animals followed by the cross bred cattle to sustain the milk production needs in the sampled districts and the state.
2. The age at first calving found to have considerable economic significance to the farmers because the cost of rearing heifer from birth to calving and consequently the milk yield are strongly influenced by this character.
3. The average gestation period was almost same in both the selected district. It was further observed that on an average more than one service per conception was required.
4. On an average, duration of milk yield was 58 and 63 days in Hisar and Karnal districts, respectively. The milk yield was found to decrease with the increase in herd size in both the districts.
5. As a result of economies of large size, labour cost decreased with increase in herd size in both the districts. The net maintenance cost per milch buffalo was highest

in winter season and lowest in rainy season on all the herd size groups.

6. On an average the net profit of milk production of a buffalo per day was highest on small herd size group followed by medium and large size group in Hisar district. In Karnal district the net or gains per day was highest on small followed by large and medium herd size groups.
7. The net profit per buffalo per day was higher in winter season and lowest in summer, in case of small herd size groups in Hisar district and on medium and large herd size groups in rainy and lowest again in summer. In Karnal district, the trend was slightly different. The net return was highest in rainy season in case of all the herd size groups but lowest in summer season in case of small and in winter season in case of medium and large herd size of groups.
8. On an average about 48 and 58% of the total milk produced was sold as fresh milk in Hisar and Karnal district, respectively.

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