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Economic efficiency of crossbred cattle under organised farm

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Abstract
An analysis was performed to study the herd structure, herd performance and labour utilization pattern in crossbred herd maintained at Research cum Development Project on Cattle (RCDP on Cattle), at Mahatma Phule Krishi Vidyapeeth, Rahuri over the period of 1990-1991 to 2019-2020. The records pertaining to production data on crossbred herd were collected for the present study. The observations on the total quantity of feed and fodder consumed, total labour utilized on farm, total milk yield and expenditure on feed and labourers were calculated as per the prevailing prices. The results revealed that the amount of concentrates, green fodder and dry fodder consumed during the period were range between 132.47 to 145.51, 1792.51 to 5207.13 and 87.4 to 681.73 MT with the average annual consumption of 140.84, 3028.79 and 375.39 MT, respectively. The overall mean cost was found to be Rs. 632737.59 for concentrates, Rs. 476300 for green fodder and Rs. 659034 for dry fodder. The cost of dry fodder forms the major component of feed cost. The average feed cost observed to be Rs. 1768071.00 for crossbred herd at RCDP on Cattle, MPKV Rahuri. The total labour utilized on farm and total labour cost were ranged between 646 to 1566 units and cost around Rs. 331691.47 to Rs. 8989012 with the mean values of 1356.75 units with an amount Rs. 1934528.00 respectively. The mean feed and labour cost over the period was found to be Rs. 3702599.00.

Keywords: Income from milk, feed cost, labour cost, crossbred cattle, efficiency

Introduction
In the Indian livestock sector, cattle are essential to the production of milk. There are 199.1 million cattle in India, of which 73 million are adult female cattle. The significance of crossbred cattle in comparison to indigenous cattle was demonstrated by the fact that the average milk productivity of crossbred cattle in India is significantly higher (6.63 kg/day/animal) than that of indigenous cattle (2.22 kg/day/animal) (State/UT AH Department, 2021-22).

The Research-Cum-Development Project (RCDP) on Cattle replaces the AICRP on Cattle. The crossbreds were expected to produce a least of 2000 kg of milk per lactation, with a herd average of 3200 kg, and a minimum of 3.5% fat in the milk. In order to create half-bred and triple crosses, Gir cows were bred with frozen semen from progeny tested Jersey and Holstein Friesian bulls.

Producers and production consultants seeking to uncover economically efficient farm management improvements must evaluate the productivity of their dairy herd. Modifying production routines, methods, and strategies may also be motivated by accurate and valid signals of possible areas for management improvement. Prior to making judgments about legislation pertaining to animal welfare, the distribution of research funding and extension initiatives, and breeding objectives, leaders of farm organizations, legislators, and scientists could find it useful to examine the production efficiency of a wide range of herds.

Labors are essential to the productive and seamless operation of the farm. It is the most important resource affecting how money and materials invested in dairy production are used properly. The main elements influencing the price of producing milk and the general productivity of the farm are labor efficiency and the assignment of tasks to laborers. Even at slightly higher cost, the use of trained labor increases product output, which ultimately lowers manufacturing costs. Very little research has been done in India on how much labour are used in dairy farming and how much that costs for the milking process etc. (Prabhakaran and rout, 1980; Nanda *et al* 1988; Legha and Mehla, 1992) [5, 3, 1]. Hence the present attempts was undertaken to study the economic efficiency of crossbred cattle under organized farm.

Materials and methods

The data pertaining production records of crossbred cattle maintained at Research cum Development Project on Cattle (RCDP on Cattle), at Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar, Maharashtra over the period of 1990-1991 to 2019-2020 were utilized for the present research.

Economic Efficiency were calculated by following formula

1. Income from milk= Milk yield (kg) X Price per Kg (Rs)
2. Cost of concentrates= Qty consumed during year(kg) X Price per Kg (Rs)
3. Cost of dry fodder= Qty consumed during year(kg) X Price per Kg (Rs)
4. Cost of green fodder = Qty consumed during year(kg) X Price per Kg (Rs)
5. Total labour cost for all units (Rs)
6. Income over feed cost (IOFC) = Total income – Feed cost
7. Income over feed and labour cost (IOFLC) = Total income – feed and labour cost

Results and Discussions

Herd strength is one of the important factors affecting milk Production, labour management and overall economy of the farm. Increase in herd strength through Productive animals (milking cows) and breedable heifers is likely to increase total milk Production of herd were as uncontrolled increase in non-Productive animals (dry animals, male calves and females with inferior growth) in the herd directly lids to additional burden to available resources like housing, feeds and fodder and thereby reduced the Profitability and efficiency of the farm. Therefore, the herd strength of the farm has been evaluated in the terms of total strength and in relation to Productive and non-Productive stock over 30 years Period.

Critical examination of the observation in table 1 reveals that in crossbred herd the cow units constituted 33.28 percent whereas heifer units (>1 year) constituted 27.36 percent of the total herd strength. The herd strength showed a rising trend from year 1990-91 to 1996- 97 showing that herd was growing continuously the cow units also from 250 to 275 for the above period. Whereas, from 1997-98 to 2019-20 showing the declining trend of total strength of herd continuously. If we observed the averages of herd strength, cow units and heifer units. Herd structure is showed in table no. 1.

Table 1: Average composition and strength of crossbred cattle

Year	Cow	Heifer >1y	Calves <1y	Male Calves	Breeding Bull	Castrated Male	Bullocks	Teaser	Total strength
1990-1991	250 (31.21)	201 (25.09)	182 (22.72)	132 (16.48)	11 (1.37)	15 (1.87)	4 (0.50)	6 (0.75)	801 (100.00)
1991-199	286 (34.17)	223 (26.64)	175 (20.91)	122 (14.58)	10 (1.19)	11 (1.31)	4 (0.48)	6 (0.72)	837 (100.00)
1992-1993	275 (32.82)	215 (25.66)	170 (20.29)	148 (17.66)	10 (1.19)	10 (1.19)	4 (0.48)	6 (0.72)	838 (100.00)
1993-1994	248 (30.73)	232 (28.75)	168 (20.82)	130 (16.11)	9 (1.12)	10 (1.24)	4 (0.50)	6 (0.74)	807 (100.00)
1994-1995	256 (32.86)	219 (28.11)	158 (20.28)	122 (15.66)	8 (1.03)	6 (0.77)	4 (0.51)	6 (0.77)	779 (100.00)
1995-1996	260 (33.64)	216 (27.94)	150 (19.40)	125 (16.17)	8 (1.03)	6 (0.78)	2 (0.26)	6 (0.78)	773 (100.00)
1996-1997	275 (31.25)	237 (26.93)	182 (20.68)	168 (19.09)	8 (0.91)	4 (0.45)	2 (0.23)	4 (0.45)	880 (100.00)
1997-1998	225 (29.88)	194 (25.76)	182 (24.17)	134 (17.80)	8 (1.06)	4 (0.53)	2 (0.27)	4 (0.53)	753 (100.00)
1998-1999	218 (29.70)	187 (25.48)	187 (25.48)	124 (16.89)	8 (1.09)	4 (0.54)	2 (0.27)	4 (0.54)	734 (100.00)
1999-2000	212 (29.44)	179 (24.86)	176 (24.44)	136 (18.89)	7 (0.97)	4 (0.56)	2 (0.28)	4 (0.56)	720 (100.00)
2000-2001	208 (29.71)	182 (26.00)	182 (26.00)	111 (15.86)	7 (1.00)	4 (0.57)	2 (0.29)	4 (0.57)	700 (100.00)
2001-2002	201 (28.55)	179 (25.43)	163 (23.15)	145 (20.60)	7 (0.99)	4 (0.57)	2 (0.28)	3 (0.43)	704 (100.00)
2002-2003	195 (28.63)	182 (26.73)	157 (23.05)	131 (19.24)	7 (1.03)	4 (0.59)	2 (0.29)	3 (0.44)	681 (100.00)
2003-2004	192 (28.57)	174 (25.89)	152 (22.62)	138 (20.54)	7 (1.04)	4 (0.60)	2 (0.30)	3 (0.45)	672 (100.00)
2004-2005	193 (30.44)	169 (26.66)	129 (20.35)	127 (20.03)	7 (1.10)	4 (0.63)	2 (0.32)	3 (0.47)	634 (100.00)
2005-2006	182 (29.98)	165 (27.18)	128 (21.09)	118 (19.44)	5 (0.82)	4 (0.66)	2 (0.33)	3 (0.49)	607 (100.00)
2006-2007	186 (32.52)	159 (27.80)	127 (22.20)	95 (16.61)	5 (0.87)	0 (0.00)	0 (0.00)	0 (0.00)	572 (100.00)
2007-2008	150 (29.41)	139 (27.25)	119 (23.33)	94 (18.43)	5 (0.98)	0 (0.00)	0 (0.00)	3 (0.59)	510 (100.00)
2008-2009	189 (35.20)	147 (27.37)	108 (20.11)	84 (15.64)	5 (0.93)	4 (0.74)	0 (0.00)	0 (0.00)	537 (100.00)
2009-2010	192 (33.10)	158 (27.24)	149 (25.69)	74 (12.76)	5 (0.86)	2 (0.34)	0 (0.00)	0 (0.00)	580 (100.00)

2010-2011	175 (32.29)	157 (28.97)	147 (27.12)	54 (9.96)	5 (0.92)	2 (0.37)	0 (0.00)	2 (0.37)	542 (100.00)
2011-2012	180 (34.55)	159 (30.52)	129 (24.76)	46 (8.83)	5 (0.96)	0 (0.00)	0 (0.00)	2 (0.38)	521 (100.00)
2012-2013	202 (35.63)	187 (32.98)	123 (21.69)	48 (8.47)	5 (0.88)	0 (0.00)	0 (0.00)	2 (0.35)	567 (100.00)
2013-2014	196 (35.44)	172 (31.10)	137 (24.77)	41 (7.41)	5 (0.90)	0 (0.00)	0 (0.00)	2 (0.36)	553 (100.00)
2014-2015	145 (33.96)	129 (30.21)	108 (25.29)	38 (8.90)	5 (1.17)	0 (0.00)	0 (0.00)	2 (0.47)	427 (100.00)
2015-2016	182 (39.48)	147 (31.89)	95 (20.61)	31 (6.72)	4 (0.87)	0 (0.00)	0 (0.00)	2 (0.43)	461 (100.00)
2016-2017	174 (40.28)	139 (32.18)	83 (19.21)	30 (6.94)	4 (0.93)	0 (0.00)	0 (0.00)	2 (0.46)	432 (100.00)
2017-2018	173 (38.11)	138 (30.40)	109 (24.01)	28 (6.17)	4 (0.88)	0 (0.00)	0 (0.00)	2 (0.44)	454 (100.00)
2018-2019	168 (40.78)	120 (29.13)	94 (22.82)	25 (6.07)	3 (0.73)	0 (0.00)	0 (0.00)	2 (0.49)	412 (100.00)
2019-2020	122 (46.21)	68 (25.76)	49 (18.56)	20 (7.58)	3 (1.14)	0 (0.00)	0 (0.00)	2 (0.76)	264 (100.00)
N	30 (33.28)	30 (27.36)	30 (22.52)	30 (14.18)	30 (1.00)	19 (0.75)	16 (0.35)	30 (0.48)	30 (100)
Mean	203.66	172.43	140.6	93.96	6.33	5.57	2.62	3.13	625.06
S.E.	7.36	6.71	6.33	8.36	0.38	0.78	0.23	0.33	27.96
C.V.%	19.8	21.33	24.69	48.77	33.25	108.65	107.1	57.9	24.5

The average composition of other categories of animals has also been studied. It is seen that the average total herd strength for the period under study was 625.06. The average cows and heifers constituted 203.66 and 172.43 of the total herd strength respectively. The cow units in relation to total herd strength seem to be little less, under ideal situation it would have been around 35 to 40 percent. The other classes of animal were calves <1 year (22.52%) male calves (14.18%) breeding bull (1.00%) castrated male (0.75%) teaser (0.48%) and bullocks (0.35%).

Nowicki and Jaczewski (1974) [4] from a study of 370 Polish Black and White Lowland cows over the period 1946-1967, concluded that optimum herd structure was observed as: 52.7 percent mature cows, 15.8 percent calf heifers, 21.0 percent heifers aged six months 1 ½ year and 10.5 per cent heifers aged <6 months. Of the lactating cows 29.2 were in the first lactation 23.3 in the second, 18.5 in the third, 14.9 in the fourth, 8.7 in the fifth and 5.3 per cent in the 6th lactations.

Among the different indices of economic efficiency of dairy herds, milk yield, feed efficiency (milk output per feed input), income over feed cost (IOFC) and income overfeed and labour cost (IOFLC) are important factors in dairy farming. The efficiency measures are required to evaluate the management and economic success of any herd. The income over feed cost and income over feed and labour cost was studied for herd and results are presented in table 2.

Table 2: Total Feed, Labour Cost, Income from Milk, Income Over Feed Cost, Income Over Feed and Labour Cost

	Total Concentrates		TotalGreen Fodder		Total Dry Fodder		Total Fodder	Total Labour	Total Labour	Total Cost (Feed +	Total Milik	Income	Income Over Feed	Income Over Feed
Year	Qty	Cost	Qty	Cost	Qty	Cost	Cost (Rs)	Unit	Cost	Labour)	Yield	From Milk	Cost	LabourCost
1990-1991	145.02	14502.6	3448.11	34481.17	612.94	61294.7	110278.47	1944	221413	331691.47	503416	493151	382872.53	161459.53
1991-1992	143.73	14373.3	3444.88	68897.72	624.25	62425.9	145696.92	1412	298274	443970.92	493151	971120	825423.08	527149.08
1992-1993	144.02	28804.2	3271.58	65431.6	681.73	136346.6	230582.4	1458	367728	598310.4	485560	941604	711021.6	343293.6
1993-1994	145.27	29055.6	3676.76	73535.32	457.35	91470.4	194061.32	1473	455376	649437.32	470802	1409736	1215674.68	760298.68
1994-1995	144.89	43467.3	3783.63	189181.65	393.05	196526	429174.95	1464	545100	974274.95	469912	1401048	971873.05	426773.05
1995-1996	141.16	70581	3363.21	168160.75	356.86	178430	417171.75	1465	828202	1245373.75	467016	1887364	1470192.25	641990.25
1996-1997	144.20	72100.5	3194.45	223611.92	304.20	212944.9	508657.32	1454	1017027	1525684.32	471841	2353920	1845262.68	828235.68
1997-1998	145.67	72838.5	2930.50	205135.42	435.22	348179.2	626153.12	1488	1113600	1739753.12	470784	2355020	1728866.88	615266.88
1998-1999	143.84	86304.6	2874.82	201237.68	558.93	503045.1	790587.38	1464	1201690	1992277.38	471004	2358370	1567782.62	366092.62
1999-2000	143.35	114681.6	3465.23	242566.24	484.25	460046.05	817293.89	1480	1374165	2191458.89	471674	2706666	1889372.11	515207.11
2000-2001	145.51	145515	2892.32	231385.76	484.28	484280	861180.76	1444	1519470	2380650.76	451111	2605194	1744013.24	224543.24
2001-2002	143.96	143967	3358.75	268700.32	528.50	528502	941169.32	1526	1448820	2389989.32	434199	2540982	1599812.68	150992.68
2002-2003	145.73	145731	3791.79	341261.28	453.10	453101	940093.28	1532	1408840	2348933.28	423497	2491650	1551556.72	142716.72
2003-2004	145.48	174585.6	3541.26	318713.4	453.82	453825	947124	1477	2025550	2972674	415275	2889523	1942399	-83151
2004-2005	142.96	171558	3161.66	284550.12	474.46	711703.5	1167811.62	1561	2120369	3288180.62	412789	3310032	2142220.38	21851.38
2005-2006	141.89	184466.1	2992.04	299204	403.48	605224.5	1088894.6	1480	2110587	3199481.6	413754	3307280	2218385.4	107798.4
2006-2007	144.43	216657	3398.05	339805.6	402.85	805702	1362164.6	1566	2215478	3577642.6	413410	3297584	1935419.4	-280058.6
2007-2008	145.26	290526	3125.85	312585.3	339.49	678998	1282109.3	1464	2236852	3518961.3	412198	4113350	2831240.7	594388.7
2008-2009	140.87	422631	3365.14	336514.1	420.07	840146	1599291.1	1343	2239847	3839138.1	411335	4534739	2935447.9	695600.9
2009-2010	142.19	568776	5207.13	1041426.8	512.34	1537038	3147240.8	1434	2241879	5389119.8	412249	5001490	1854249.2	-387629.8
2010-2011	139.22	696135	2480.15	496030.4	88.17	264528	1456693.4	1408	2154879	3611572.4	384730	5262880	3806186.6	1651307.6
2011-2012	133.90	669525	2019.45	403890.4	317.1	1268400	2341815.4	1479	2458748	4800563.4	375920	5288775	2946959.6	488211.6
2012-2013	135.26	946848	2313.96	694189.5	184.6	923000	2564037.5	1362	2595874	5159911.5	352585	6126600	3562562.5	966688.5
2013-2014	134.73	1077912	2288.4	915360	324.51	1622550	3615822	1228	2635847	6251669	306330	7823175	4207353	1571506

2014-2015	132.47	1324710	2041.84	816738	221.4	1217700	3359148	1142	3025879	6385027	312927	7490745	4131597	1105718
2015-2016	134.51	1614168	2117.49	1058745	150.4	902400	3575313	1029	3598471	7173784	277435	9196200	5620887	2022416
2016-2017	133.17	1997685	2101.55	1050775	122.1	732600	3781060	955	3784269	7565329	306540	8739232	4958172	1173903
2017-2018	134.71	2020725	2588.15	1294077	87.4	611800	3926602	782	3874445	7801047	273101	8810480	4883878	1009433
2018-2019	133.23	2664780	2833.1	1416550	200.4	1402800	5484130	743	3258931	8743061	251728	9748526	4264396	1005465
2019-2020	134.47	2958516	1792.51	896255	184.5	1476000	5330771	646	3658241	8989012	244852	9472583	4141812	483571
Mean	140.84	632737.59	3028.79	476300	375.39	659034	1768071	1356.76	1934528	3702599	402037.5	4297633.97	2529562.97	595034.97
S.E.	0.87	151996.41	129.36	71888.6	29.71	84424.9	283842	50.39	197731	469219.69	14067.56	521259.29	257065.49	101361.3
C.V.%	3.39	131.57	23.39	82.66	43.35	70.16	87.93	20.34	55.98	69.41	19.16	66.43	55.66	93.3

The observations on the total quantity of feed and fodder consumed, total labour utilized for farm, total milk yield and income from, cost of feed and labourers are presented in table 1. From the results it is reveals that the amount of concentrates, green fodder and dry fodder consumed during the period range between 132.47 to 145.51 MT, 1792.51 to 5207.13 MT and 87.4 to 681.73 MT with the average annual consumption of 140.84 MT, 3028.79 MT, and 375.39 MT respectively.

The overall mean cost was found to be Rs. 632737.59 for concentrates, Rs. 476300 for green fodder and Rs. 659034 for dry fodder. The cost of dry fodder forms the major component of feed cost. The average feed cost observed to be Rs. 1768071 for crossbred herd at RCDP on Cattle, MPKV Rahuri. The total labour utilized farm and total labour cost ranged between 646 to 1566 units and Rs. 331691.47 to Rs. 8989012 with the mean values of 1356.75 units. and Rs. 1934528 respectively. The mean feed and labour cost over the period was found to be Rs. 3702599.

The overall average milk yield was 402037.5 kg and the average income from milk was observed to be Rs. 4297633.97 for the entire period.

Miller *et al*. (1968) [2] studied yearly herd average records from 1801 Holstein herds during 1960-1964 and recorded that milk yield (62%) and income over feed cost (62%) had the largest variance among herds. Milk yield accounted for about half of the total variance in income over feed cost. The amount of concentrate fed was the only feed measure closely related to income over fe6d cost. The amount of hay fed had little influence on production and income over feed cost.

Singh *et al*. (1985) [6] studied economics of milk production on farms of different sizes in Uttar Pradesh. It was observed that there existed a complementarity between crop and livestock production on the sample farms. The complementarity was more prominent on the small farms with low land base. The income of the farmers may be increased to manifold by maintaining good milch animals adopting the improved management practices. The average net maintenance cost of a cow per annum was worked out to Rs. 1210.61. Out of total maintenance cost of cow, 48.19 per cent was spent on fodder, 20.48 on concentrate, 14.73 on overhead cost, 12.80 on labour and 2.80 per cent on miscellaneous.

By incorporating the labour cost, the income over feed and labour cost (IOFLC) was work out for crossbred herd. It was observed that for middle of the period three times had negative values for the IOFLC. This may be due to less milk production accompanied with low price of milk in initial period and comparatively higher labour wages and cost of concentrates. In general, low milk yield low selling rate of cost of feed particularly concentrates, dry grass and labour wages were the principle factors influencing the IOFC and IOFLC values negatively.

Conclusion

From the results it can be noted that income over feed cost showed positive values for entire period where as average mean income over feed cost was Rs. 2529562.97.

References

1. Legha RA, Mehla RK. Labour utilization pattern of three different dairy farms. Journal of Dairying, Foods and Home Science. 1992;(3):130-134.
2. Miller RH. Studies of DHIA yearly herd averages. I. Predicting income over feed cost. Journal of Dairy Science; 1968;51:1840.
3. Nanda J, Mishra M, Pradhan B. Time motion study of labour requirements for management of crossbred cows. Indian Journal of Animal Production and Management; 1988;4(2):66-70.
4. Nowicki B, Jaczewski S. Effect of herd structure on breeding progress and productivity, Animal Breeding Abstracts. 1974;41(2):62.
5. Prabhakaran VT, Raut KC. Labour utilization in bovine keeping under mixed farming system in rural areas. Indian Journal of Animal Science; 1980;(12):1029-1034.
6. Singh GN, Singh SD, Gupta BK, Mishra PD. Economics of milk production on farms of different sizes in district Farrukabad, U.P. Asian Journal of Dairy Research; 1985;1(1):29-35.