

# Economic impact of milk price incentive scheme on dairy farming in Karnataka

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**Abstract :** The present study attempts to examine the economic impact of milk price incentive scheme announced by Government of Karnataka on production, productivity and profitability of milk production in Karnataka. To assess the impact of scheme on production and productivity of milk, time series data on number of milch cows and buffaloes, production and productivity were collected from livestock census reports from 1997 to 2019. To examine its impact on profitability, pertinent information was elicited from 60 sample dairy farmers coming under the jurisdiction of SHIMUL, Karnataka. Exponential growth models, production function considering production/productivity as dependent variable and share of cross bred in total milch bovine population, dummy variable to capture the influence of scheme as independent variables and enterprise budgeting to examine profitability were employed. The results indicated that number of indigenous milch cows and buffaloes have decelerated while that of cross bred cows have accelerated at a greater pace. Substantial and significant Milk production in case of cross bred cows was due to extensive production while in case of indigenous bovines it was mainly due to intensive production. The milk price incentive of Rs.5 per litre announced by Government of Karnataka in 2016 has increased milk production by 79.90 percent and productivity by 115 percent compared to milk production and productivity without milk incentive (prior to 2008). The share of

cross bred cows has almost doubled after the implementation of the scheme. In terms of profitability, farmers were under loss of Rs. 1.43 per litre of milk in the absence of incentive while they realized profit of Rs. 3.57 per litre with Rs. 5 per litre as incentive. Delay in the payment of incentive and its inability to keep the rising pace of growth in input prices are considered as the major lacuna of the scheme. Farmers have suggested for doubling the existing incentive to Rs. 10 per litre to absorb the shock of rising prices of inputs and to obtain sustained profit.

**Keywords:** Incentive, SHIMUL, Exponential growth models, Economic impact

## Introduction

In order to encourage the rural farmers to involve themselves in dairy farming, a lucrative subsidiary occupation, Government of Karnataka in the Year 2008 launched a flagship scheme entitled “Milk incentive Scheme” to provide an incentive of Rs. 2 per litre for those dairy farmers who sell their milk to Milk Producers cooperative societies situated in the rural areas. Later, the Government of Karnataka realized the marked impact of the milk incentive scheme of 2008 in terms of increased productivity and production of milk forcing it to revise the incentives from Rs. 2 per litre to Rs. 4 per litre. The revised incentive of Rs. 4 per litre was brought into letter and spirit from 2013. The process of revision did not halt, rather it gained momentum and again a revision of incentive price from Rs. 4 per litre to Rs. 5 per litre was announced in the year 2016. The objective of the scheme was to make dairying a profitable enterprise especially for marginal and small farmers, landless labourers, individuals belonging to the weaker sections and women folk. The other objective is to increase milk production to impart food security, improve socio-economic condition of dairy farmers, encourage cooperatives in dairy sector and to attract rural youth to dairying thereby their migration could be avoided. In this context, it becomes imperative to probe into the impact assessment of milk incentive scheme on dairy farming.

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## Methodology

The study aimed at assessment of economic impact of milk incentive scheme on milk production and productivity, profitability of dairy farming in Karnataka state. The study was carried out hypothesizing that provision of incentive prices to dairy farmers enables them to exhibit transition in bovine composition. It was also hypothesized that due to change in bovine composition, milk productivity and production changes and have bearing on profitability of milk production. The scheme was even hypothesized to have positive bearing on expansion of cooperatives in dairy sector. The hypotheses were formulated to validate the functioning of the scheme keeping its specific objectives as reference.

## Data

To accomplish the specific objectives of the study, secondary data on number of milch bovines viz., indigenous cows, crossbred cows and buffaloes were collected from the published livestock census reports. State wise statistics on number of milch animals was available in the Livestock Census reports of 1997, 2003, 2007, 2012 and 2019 while district wise statistics was available in all other census reports excepting for 2019. From the same reports, data on milk productivity and production of different milch bovines (indigenous cows, crossbred cows and buffaloes) was also collected. The temporal data on milk production available for the Karnataka state from 1997 to 2019 was also collected. To ascertain the impact of the scheme on the expansion of cooperatives in dairy sector, secondary data on number of dairy cooperative societies, number of cooperative members, milk procurement per day, payment made to the dairy farmers and total turnover of the KMF were elicited from the annual report of the KMF. The impact of scheme on bovine composition and in-turn bovine composition's bearing on milk productivity and production was ascertained for the districts coming under the jurisdiction of SHIMUL i.e., Chitradurga, Davangere and Shivamogga.

The perusal of temporal data on number of indigenous milch animals and cross bred animals and their relative share in the total milch bovine population in districts coming under SHIMUL jurisdiction clearly indicated the inclination shown by the dairy farmers towards cross bred cows. Accordingly, to assess the impact of milk incentive price given by the government of Karnataka to the dairy farmers to boost the production of milk, purposively dairy farmers rearing more of cross bred cows were chosen. The intention behind selection of farmers rearing more of cross bred cows was to examine how the scheme has made impact on the profitability these farmers. Working out of economics provides the researcher a hunch on the cost incurred per litre of milk production, average returns or price realized per litre with and without incentive price. How with the escalating prices of inputs, dairy farmers rearing more of cross bred cows

are managing dairy enterprise could be ascertained. Around 60 sample dairy farmers coming under the jurisdiction of Shivamogga Milk Union Limited (SHIMUL) was selected. The primary data on the capital investment made on the dairy unit, type of bovines reared, experience in dairy farming, number of milch cows reared, expenditure made on variable resources like human labour, feed such as dry fodder, concentrates and green fodder, medicines and vaccines, output realized in the form of milk, cowdung, calves etc, price at which milk, cowdung, calves in case if sold was elicited. In addition, since from when, the benefits of incentive prices were received, opinion about milk incentive scheme and suggestions for improvement in the implementation of scheme was also elicited.

The temporal growth in milk production, milk productivity and number of milch bovines over census was estimated using exponential growth model.

$$Y_t = ab^t \cdot e^t$$

$Y_t$  = Milk production/Milk productivity/Number of milch bovines in Karnataka state or of respective districts viz., Shivamogga, Davangere and Chitradurga coming under the jurisdiction of SHIMUL

a= Y- intercept

b= slope coefficient

e = Stochastic error term

t= time period (census)

The estimable form of the exponential model was arrived at by taking logarithmic transformation

$$\ln Y_t = \ln a + t \ln b$$

The compound rate of growth over census period was estimated using

$$\text{CGR (\%)} = (\text{antilog } b - 1) * 100$$

## Impact of milk incentive price on milk production in Karnataka

The impact of milk incentive scheme on milk production in Karnataka was examined by estimating milk production function. Milk production function establishes functional relationship between milk production and variables capturing the influence of milk incentive scheme (institutional intervention) and share of milch crossbred cows in total milch bovines. Institutional intervention in the form of milk incentive scheme was announced by Government of Karnataka in three phases announcing incentives of Rs. 2 per litre from 2008, Rs. 4 per litre from 2013 and Rs. 5 per litre from 2016. Since, it is a qualitative variable, its influence was captured using dummy variables. As there were

four categories, three dummy variables were used viz.,  $D_1$ ,  $D_2$  and  $D_3$ . It was hypothesized that both the independent variables i.e., institutional intervention and share of cross bred cows in total milch bovine population bears positive influence on the dependent variable i.e., milk production.

$$\text{Milk Production} = a + b_1D_1 + b_2D_2 + b_3D_3 + b_4X + e$$

$D_1$  is a dummy variable taking value 1, 0, 0 to represent milk incentive of Rs. 2 per litre announced during 2008

$D_2$  is a dummy variable taking value 0, 1, 0 to represent milk incentive of Rs. 4 per litre announced during 2013

$D_3$  is a dummy variable taking value 0, 0, 1 to represent milk incentive of Rs. 5 per litre announced during 2016

$X$  – ratio of number of milch crossbred cows in total number of milch bovines

$e$ - stochastic error term

$a$  indicates Y-intercept

$b_1, b_2, b_3, b_4$  indicates partial regression coefficients

#### Impact of milk incentive price on milk productivity in Karnataka

The milk productivity in Karnataka was hypothesized to be influenced by the institutional intervention of the Government in the form of announcement of milk incentive scheme. The very aim of the scheme was to motivate farmers in rural areas to undertake dairying to increase milk production. Increased milk production may be due to increase in the number of high milk yielding bovines or through change in bovine composition i.e., shift from indigenous cows/buffaloes to cross bred cows (Khalandar *et.al.*, 2019). The provision of incentives may be considered as key for motivating farmers to increase milk production through switching over to high yielding crossbred cows. Hence, it becomes imperative to decipher the influence of milk incentive scheme and change in the bovine composition captured via share of milch crossbred cows in total milch bovines on milk productivity. Linear relationship was established between independent and dependent variables. Institutional intervention was observed in three phases since, it is a qualitative variable, its influence was captured using three dummy variables. The functional form is presented below

$$\text{Milk Productivity} = a + b_1D_1 + b_2D_2 + b_3D_3 + b_4X + e$$

$D_1$  is a dummy variable taking value 1, 0, 0 to represent milk incentive of Rs. 2 per litre announced during 2008

$D_2$  is a dummy variable taking value 0, 1, 0 to represent milk incentive of Rs. 4 per litre announced during 2013

$D_3$  is a dummy variable taking value 0, 0, 1 to represent milk incentive of Rs. 5 per litre announced during 2016

$X$  – ratio of number of milch crossbred cows in total number of milch bovines

$e$ - stochastic error term

$a$  indicates Y-intercept

$b_1, b_2, b_3, b_4$  indicates partial regression coefficients

#### Results and Discussion

##### Transition in milch bovine population in Karnataka

Number of indigenous milch cows and buffaloes exhibited negative growth in Karnataka state over the livestock census at the rate of 14.04 and 9.02 percent, respectively. The scenario was not that different in case of districts coming under the jurisdiction of SHIMUL i.e., Shivamogga, Chitradurga and Davangere. The negative growth of 1.26 and 10.85 percent in Shivamogga, 2.03 and 2.79 percent in Chitradurga and 12.94 and 7.22 percent in Davangere was observed. With respect to crossbred cows, the rate of growth in their number was positive in case of Karnataka, Shivamogga, Chitradurga and Davangere at 35.76, 42.41, 60.75 and 39.85 percent respectively (Table 1). The percent change indicates the relative changes or deviation in relative terms occurred in the number of milch bovines. The percentage change was negative at 49.97 and 32.68 percent with respect to indigenous cows and buffaloes in case of Karnataka state while it was positive at 233.04 percent in case of crossbred cows. It reiterates the results of exponential growth model. Similar pattern of deviation was observed in the districts coming under the jurisdiction of SHIMUL. Number of respective category of milch bovine has exhibited a declining trend over the census compared to the base period (1997). The growth rate provides an insight about the transition occurred in the bovine composition among the dairy farmers. Farmers have shown an inclination towards rearing of crossbred cows which are input responsive and high yielding compared to indigenous milch cows and buffaloes. Though, from food security point of view it is a welcoming sign but contrarily on sustainability front, it could be regarded as a forewarning.

##### Growth in milk production in Karnataka

The temporal progress in milk production could be ascertained through estimation of growth rates. Increased production may be due to increase in number of milch animals (extensive production) or due to increased productivity (intensive production). Karnataka state as a whole exhibited positive but a meager growth of 0.9 and 2.81percent in milk production of indigenous milch cows and buffaloes while the rate of growth in milk production among crossbred cows stood at 37.46 percent. Increased milk production in case of indigenous milch cows and

buffaloes was due to increased productivity and could be inferred as intensive production while in case of crossbred cows, increased production was due to increase in the number of milch animals and hence inferred as extensive production.

The rate of growth in milk production of crossbred milch cows in case of Shivamogga, Chitradurga and Davangere was positive and substantial at 42.95, 49.61 and 46.74 percent, respectively. The milk production of indigenous milch cows exhibited positive growth of 8.13 percent and 12.82 percent in Shivamogga and

Davangere districts, respectively while it was negative at 7.08 percent in case of Chitradurga. Negative rate of growth of 8.81 percent and 13.19 percent was observed in case of buffalo's milk production in Shivamogga and Chitradurga districts, respectively while it was positive in case of Davangere at 9.25 percent. The negative growth in milk production of indigenous milch cows/ buffaloes was due to the deceleration in their actual numbers which superseded the influence of their positive rate of growth in productivity.

**Table 1:** Transition in milch bovine composition in Karnataka state and districts coming under SHIMUL

Livestock census	Milch animals ('000)				
	Indigenous cows ('000)	Crossbred cows ('000)	Buffaloes ('000)	Milch cattle ('000)	Milch bovines ('000)
<b>Karnataka</b>					
1997	2978	690	2335	3668	6003
2003	2500	903	2215	3403	5618
2007	2656	1259	2374	3915	6289
2012	2201	1732	1898	3933	5831
2019	1490	2298	1572	3788	5360
CGR (%)	-14.04	35.76	-9.02	2.11	-1.88
Percent change	-49.97	233.04	-32.68	3.27	-10.71
<b>Shivamogga</b>					
1997	163	21	103	184	287
2003	150	30	94	180	274
2007	163	42	91	205	296
2012	152	61	71	213	284
CGR (%)	-1.26	42.41	-10.85	5.86	0.46
Percent change	-6.75	190.48	-31.07	15.76	-1.05
<b>Chitradurga</b>					
1997	76	5	93	81	174
2003	73	9	100	82	182
2007	83	14	106	97	203
2012	68	21	83	89	172
CGR (%)	-2.03	60.75	-2.79	4.61	0.75
Percent change	-11.76	76.19	-12.05	8.99	-1.16
<b>Davanagere</b>					
1997	92	25	120	117	237
2003	77	39	122	116	238
2007	81	58	120	139	259
2012	57	67	94	124	218
CGR (%)	-12.94	39.85	-7.22	3.62	-1.65
Percent change	-38.04	168.00	-21.67	5.98	-8.02

**Growth in milk productivity in Karnataka**

Karnataka state as a whole experienced positive and substantial rate of growth of 9.82 and 8.64 percent in terms of milk productivity of indigenous milch cows and buffaloes, respectively while the rate of growth was a meager 0.89 percent in case of crossbred cows. Shivamogga and Davanagere also experienced similar trend in terms of milk productivity of indigenous cows, buffaloes and crossbred cows. The trend was exactly opposite in case of Chitradurga district wherein negative growth was observed in terms of milk productivity across indigenous milch cows, buffaloes and crossbred cows.

**Impact of ‘milk incentive scheme’ on milk production in Karnataka**

The estimated production function was found to be a good fit with significant ‘F’ statistic (32.24) and adjusted coefficient of multiple determination of 0.85 indicating that the included independent variables could explain variation in the dependent variable to the tune of 85 percent. The estimates of the production function were found to be statistically significant at less than one percent alpha for all the variables excepting the variable indicating share of cross bred cows in total milch bovine population. Though, it was not significant but it was economically substantial. The estimated milk production in Karnataka state could be deciphered for different situations viz., without price incentive and with price incentive. The milk production was estimated inserting the average value of independent variable (share of cross bred cows in total milch bovine population) in the

**Table 2:** Growth in Milk production in Karnataka and districts coming under SHIMUL

Livestock census	Milk Production ('000MT)					Milch bovines
	Indigenous cows	Crossbred cows	Buffaloes	Milch cattle		
<b>Karnataka</b>						
1997	1427	920	1601	2347		3948
2003	1070	1398	1350	2468		3818
2007	1229	1648	1387	2877		4264
2012	1404	2515	1740	3919		5659
CGR (%)	0.90	37.46	2.81	18.43		12.64
Percent change	-1.61	173.37	8.68	66.98		43.34
<b>Shivamogga</b>						
1997	65	26	81	91		172
2003	60	42	41	102		143
2007	73	46	55	119		174
2012	79	83	54	162		216
CGR (%)	8.13	42.95	-8.81	20.74		9.19
Percent change	21.54	219.23	-33.33	78.02		25.58
<b>Chitradurga</b>						
1997	60	9	112	69		181
2003	29	12	43	41		84
2007	33	15	56	48		104
2012	45	32	64	77		141
CGR (%)	-7.08	49.61	-13.19	4.99		-5.22
Percent change	-33.33	71.88	-75.00	10.39		-28.37
<b>Davanagere</b>						
1997	32	32	58	64		122
2003	32	49	58	81		139
2007	36	59	65	95		160
2012	46	108	75	154		229
CGR (%)	12.82	46.74	9.25	32.23		22.50
Percent change	43.75	237.50	29.31	140.63		87.70

estimated milk production function. Noteworthy observation is that the share of crossbred cows in total bovines has increased from 0.23 prior to implementation of milk incentive scheme to 0.40 with milk incentive of Rs. 5 per litre. The estimated milk production function deciphered using estimated milk production function is

depicted in Table 5. The estimates of milk production in ‘000 tonnes without incentive came to 4204 which rose to 7564 after revision of incentive to Rs. 5 per litre. The percent rise in milk production after the implementation of incentive scheme with

**Table 3:** Growth in Milk productivity in Karnataka and districts coming under SHIMUL (Litres per cow per lactation)

Livestock census	Indigenous cows	Crossbred cows	Buffaloes	Milch cattle	Milch bovines
Karnataka					
1997	479.18	1333.33	685.65	639.86	657.67
2003	428.00	1548.17	609.48	725.24	679.60
2007	462.73	1308.98	584.25	734.87	678.01
2012	637.89	1452.08	916.75	996.44	970.50
CGR(%)	9.82	0.89	8.64	14.36	12.36
Percent change	33.12	8.91	33.71	55.73	47.57
Shivamogga					
1997	398.77	1238.10	786.41	494.57	599.30
2003	400.00	1400.00	436.17	566.67	521.90
2007	447.85	1095.24	604.40	580.49	587.84
2012	519.74	1360.66	760.56	760.56	760.56
CGR(%)	9.50	0.38	2.29	14.06	8.70
Percent change	30.33	9.90	-3.29	53.78	26.91
Chitradurga					
1997	789.47	1800.00	1204.30	851.85	1040.23
2003	397.26	1333.33	430.00	500.00	461.54
2007	397.59	1071.43	528.30	494.85	512.32
2012	661.76	1523.81	771.08	865.17	819.77
CGR(%)	-5.15	-6.93	-10.70	0.36	-5.92
Percent change	-16.18	-15.34	-35.97	1.56	-21.19
Davanagere					
1997	347.83	1280.00	483.33	547.01	514.77
2003	415.58	1256.41	475.41	698.28	584.03
2007	444.44	1017.24	541.67	683.45	617.76
2012	807.02	1611.94	797.87	1241.94	1050.46
CGR (%)	29.59	4.92	17.75	27.61	24.56
Percent change	132.02	25.93	65.08	127.04	104.06

**Table 4:** Estimates of milk production function

Independent variables	Estimates (t- Value)
Ratio of milch crossbred cows in total milch bovines	2724(1.14)
D1- Dummy variable to capture the influence of Milk incentive of Rs. 2 per litre announced during 2008	793 (2.75)
D2 Dummy variable to capture the influence of Milk incentive of Rs. 4 announced per litre during 2013	1605(3.87)
D3 Dummy variable to capture the influence of Milk incentive of Rs. 5 announced per litre during 2016	2896(5.81)
Intercept	3578 (6.14)

Dependent variable – Milk Production (‘000 tonnes)

incentive of Rs. 2 per litre was 20.80 from the milk production observed during control period (4204 '000 tonnes). It rose to 44.65 percent on revising incentive price to Rs. 4 per litre and 79.90 percent on revising incentive to Rs. 5 per litre from the control.

**Table 5:** Estimated Milk production in Karnataka as influenced by milk incentive scheme and ratio of crossbred to total milch bovine population

Particulars	Year of announcement of incentive price	Average value of Share of milch crossbred cows in total milch bovines (X)	Estimated milk production function	Estimated milk production ('000 tonnes)
Without Price incentive	Prior to 2008	0.23	Milk production = $3578 + 2724 X$	4204.52
With price incentive of Rs. 2 per litre	2008	0.26	Milk production = $3578 + 793D_1 + 2724 X$	5079.24
With price incentive of Rs. 4 per litre	2013	0.33	Milk production = $3578 + 1605D_2 + 2724 X$	6082.00
With price incentive of Rs. 5 per litre	2016	0.40	Milk production = $3578 + 2896 D_3 + 2724 X$	7564.00

**Table 6:** Estimates of milk productivity function

Independent variables	Estimates (t- Value)
Ratio of milch crossbred cows in total milch bovines	0.19 (0.37)
D1- Dummy variable to capture the influence of Milk incentive of Rs. 2 per litre announced during 2008	0.19 (3.21)
D2 Dummy variable to capture the influence of Milk incentive of Rs. 4 announced per litre during 2013	0.40 (4.66)
D3 Dummy variable to capture the influence of Milk incentive of Rs. 5 announced per litre during 2016	0.71 (6.82)
Intercept	0.60 (4.97)

**Table 7:** Estimated Milk productivity in Karnataka as influenced by milk incentive price scheme and ratio of crossbred to total milch bovine population

Particulars	Year of announcement of incentive price	Average value of Share of milch crossbred cows in total milch bovines (X)	Estimated milk productivity function	Estimated milk productivity (litres per cow per lactation)
Without Price incentive	Prior to 2008	0.23	Milk productivity = $0.60 + 0.19 X$	643.70
With price incentive of Rs. 2 per litre	2008	0.26	Milk productivity = $0.60 + 0.19D_1 + 0.19 X$	839.40
With price incentive of Rs. 4 per litre	2013	0.33	Milk productivity = $0.60 + 0.40D_2 + 0.19 X$	1063.00
With price incentive of Rs. 5 per litre	2016	0.40	Milk productivity = $0.60 + 0.71 D_3 + 0.19 X$	1386.00

Estimated Milk production = 3578 + 793D<sub>1</sub> + 1605D<sub>2</sub> + 2896 D<sub>3</sub> + 2724X

The same analogy was used to estimate the milk productivity function hypothesizing that productivity is influenced by the breed composition reflected in the share of cross bred cows in the total bovine population and institutional intervention in the form of milk incentive scheme. The estimated productivity

**Impact of milk incentive scheme on milk productivity in Karnataka**

**Table 8:** Temporal growth in coverage of dairy farmers and turnover of KMF in Karnataka

Particulars	1976	2009	2013	2021	CGR %	
					between 1976 to 2009	between 2009 to 2022
Dairy Cooperative societies (no.)	416	1154	1388	1699	10.59	3.02
Milk producer members (lakh no.)	0.37	2	9	7	12.88	1.91
Milk procurement (lakh kg per day)	0.5	20.19	22.47	25.82	13.90	6.35
Daily payment to farmers (crores)	0.09	36.68	51.65	81.63	12.58	13.29
Total turnover of KMF (crores)	8.82	4.49	12.02	22.74	1803	2
		3135	9089	2	19.48	14.41

**Table 9:** Impact of milk incentive price on the profitability of dairy farming

(n=60, Average herd size = 5 milch cows)

Particulars	Qty	Rate	Value	Share (%)	Cost/ Returns per litre
Variable cost					
Human labour (mandays)					
Men	258.00	322.13	83108.25	20.48	5.00
Women	302.00	157.63	47602.75	11.73	2.87
Inputs					
Feed (tonnes)					
Adult cows					
Dry fodder	9.93	4020.00	39928.65	9.84	2.40
Green fodder	29.29	520.00	15231.45	3.75	0.92
Concentrates	5.74	20000.00	114760.00	28.29	6.91
Calves					
Dry fodder	1.66	4020.00	6662.40	1.64	0.40
Green fodder	4.50	520.00	2339.61	0.58	0.14
Concentrates	0.25	20000.00	4960.00	1.22	0.30
Milk (litres)	159.38	25.60	4080.00	1.01	0.25
Medicines			2755.00	0.68	0.17
Artificial insemination			215.63	0.05	0.01
Electricity			2531.25	0.62	0.15
Insurance premium			3082.50	0.76	0.19
Interest on working capital			11454.01	2.82	0.69
Total variable cost			338711.49	83.48	20.40
Fixed costs					
Rental value of land			217.00	0.05	0.01

Interest on fixed capital			39807.24	9.81	2.40
Depreciation			26980.39	6.65	1.62
Total fixed cost			67004.62	16.52	4.03
Total cost			405716.11	100.00	24.43
Returns					
Milk ( without price incentive)	16605.50	23.00	381926.50		
Milk (with price incentive of Rs. 5 per litre)	16605.50	28.00	464954.00		
Cowdung (Tractor loads)	4.70	9890.00	46483.00		
Sale of female calf (no.)	2.00	9000.00	18000.00		
Appreciation of adult cows	5.00	5750.00	28750.00		
Gross returns (without price incentive)			475159.50		28.61
Net returns (without price incentive)			69443.39		4.18
Gross returns (with price incentive)			558187.00		33.61
Net returns (with price incentive)			152470.89		9.18

**Table 10:** Opinion of farmers about milk incentive price scheme

Particulars	Frequency (%)
Incentive price is the root cause for transition in breed composition	43 (71.67)
Incentive price of Rs. 5 per litre announced for milk is not sufficient	60 (100.00)
Undue delay is very common in the payment of incentive prices to dairy farmers	60 (100.00)
Incentive prices given not covers the rising prices of inputs such as dry fodder, concentrates and human labour in dairy farming	53 (88.33)
Payment of incentive prices should be done regularly on monthly basis	46 (76.67)
Increase in milk price or provision of additional incentive of Rs. 5 per litre totaling to Rs. 10 per litre will benefit dairy farmers in the eve of escalating input prices	60 (100.00)

function was found to be a good fit with significant ‘F’ statistic (36.09) and adjusted coefficient of multiple determination of 0.86 indicating that the included independent variables could explain variation in the dependent variable to the tune of 86 percent. The estimates of the productivity function were found to be statistically significant at less than one percent alpha for all the variables excepting the variable reflecting breed composition i.e., share of cross bred cows in total milch bovine population. Though, it was not significant but it was economically substantial. The milk productivity was estimated inserting the average value of share of cross bred cows in total milch bovine population in the estimated milk productivity function. The estimated milk productivity function deciphered using estimated milk productivity function is depicted in Table 7. The estimates of milk productivity in litres without incentive came to 644 which rose to 1386 after revision of incentive to Rs. 5 per litre. The percent rise in milk production after the implementation of incentive scheme with incentive of Rs. 2 per litre was 30.34 from the milk productivity observed during control period (644 litres).

It rose to 65.06 percent on revising incentive price to Rs. 4 per litre and 115.22 percent on revising incentive to Rs. 5 per litre from the control.

$$\text{Estimated Milk productivity} = 0.60 + 0.19D_1 + 0.40D_2 + 0.71 D_3 + 0.19 X$$

**Impact of milk incentive scheme on growth of Karnataka Cooperative Milk Producers’ Federation limited**

Karnataka Cooperative Milk Producers’ Federation Limited (KMF) is the apex body working in the dairy sector in Karnataka state. It is considered as the second largest dairy cooperatives in the country. In Southern India, it stands first in terms of milk procurement and sales. KMF is one among few federations in the country, which has converted dairying from a subsidiary occupation to an industry. It works in line with that of AMUL and started functioning in letter and spirit from 1974-75. One of

the objectives of milk incentive scheme was to bring in enormous growth in cooperatives relating to dairy sector i.e., KMF.

The perusal of Table 8 indicates the progress of KMF from 1976 to 2021 in terms of coverage of dairy members and its turnover. To ascertain the influence of milk incentive scheme on its growth, factors such as number of dairy cooperative societies, milk producer members, daily procurement of milk, daily payment made to dairy farmers and annual turnover of KMF was considered. Growth was assessed through computation of compound growth rate using exponential model. It was estimated for two time periods i.e., prior to implementation of milk incentive scheme (1976-2009) and after the implementation of scheme (2009-2021). The rate of growth in number of dairy cooperative societies was around 10.59 percent over the span of almost three decades prior to implementation of scheme while it was 3 percent in a span of decade after the implementation of scheme. In terms of membership (coverage of dairy farmers), the rate of growth was 12.88 percent prior to the scheme while it was 1.91 percent after the implementation of scheme. The noteworthy observation in Table 8 is all about the average daily procurement of milk which was 36.68 lakh kg per day during 2009 which got almost doubled in a decade during 2021 (81.63 lakh kg per day). In terms of payment made to dairy farmers, the scenario was almost the same as above wherein payment made to farmers was around Rs. 4.49 crores which increased by almost five times to Rs. 22.74 crores during 2021. The economic performance of KMF captured in terms of its total turnover exhibited the same scenario wherein the total turnover was Rs. 3135 crores which rose to Rs. 18032 by 2021. The rate of growth in turnover was around 19.48 percent over the span of three decades while it was 14.41 percent for a span of decade signals the extent of business growth of KMF. The rate of growth exhibited by the average daily milk procurement was 13.90 percent over a span of three decades while 6.35 percent of growth was witnessed in a span of one decade after the implementation of milk incentive scheme. From the preceding discussion, it could be inferred that implementation of milk incentive scheme by Government of Karnataka has paved a way for enormous physical and economic growth of KMF i.e., cooperative sector in dairy industry.

#### **Impact of milk incentive scheme on profitability of dairy farming**

The economics of milk production has been worked out considering the average herd size of five milch animals having breed composition of four cross bred cows and one indigenous cow. The economics comprised of three sub parts viz., variable costs, fixed costs and returns (Sunil et al. 2016 and Revappa et al. 2022). The total cost incurred towards production of 16605.50 litres of milk came to Rs. 405716.11. The variable costs formed 83.48 percent of the total cost at Rs. 338711.49 while the remaining amount was shared by fixed cost at Rs. 67004.62. Of the variable cost, the expenditure made on feed and human labour cornered major chunk at Rs. 187962.1 and Rs. 130711. The opportunity cost of working capital estimated at 7 percent rate of interest

apportioned for 6 months came to Rs. 11454.01 was the next major variable cost item. Depreciation of assets and interest on fixed capital cornered major share in the total fixed costs. Returns were realized from the sale of milk, calves, cowdung and also from the appreciation in the value of lactating animals (Sadananda et. al. 2022). The gross returns and net returns without milk incentive came to Rs. 475159.50 and Rs. 69443.39. The gross returns and net returns after considering incentive of Rs. 5 per litre came to Rs. 558187.00 and 152470.89, respectively (Table 9).

The per litre cost of production of milk was estimated to be Rs. 24.43 of which Rs. 20.40 was on variable costs and Rs. 4.03 on fixed costs. Among the total cost per litre of milk, feed for adult milch animals and calves formed Rs.11.42 followed by human labour required for maintenance of dairy unit at Rs. 7.87. The price paid by the Milk union to the dairy farmers per litre was Rs. 23 exclusive of incentive. A cursory look at the disparity in cost incurred and price realized per litre of milk is the prima facie indicator of rising input prices in dairy industry and the inability of milk prices to keep the rising pace of the input prices. To make dairy industry a profitable venture, provision of incentive is a sine-qua-non for the government. The price realized per litre by the farmers after giving due consideration for the returns realized from the sale of by-products came to Rs. 28.61 leaving the net returns of Rs. 4.18 per litre. The returns from by-product is not certain hence, returns from After considering the incentive of Rs. 5 per litre, the realized price per litre inclusive of returns from the sale of by-products came to Rs. 33.61 leaving the net returns per litre of Rs. 9.18. From the preceding results, it could be inferred that on providing incentive of Rs. 5 per litre, dairy farmers could be able to reap 120 percent extra profit per litre (Table 9).

#### **Opinion of farmers regarding milk incentive scheme**

Undue delay in the payment of incentive prices, insufficiency of incentive price to cover rising prices of inputs such as concentrates, dry fodder and human labour are the major impediments encountered by the dairy farmers with respect to milk incentive scheme. Cent percent of the farmers are of the opinion that incentive prices should be hiked to Rs. 10 per litre or the prices paid per litre of milk should be increased by Rs. 5 from the existing payment (Rs. 23 per litre) to enable them to absorb the brunt of rising input prices. Vast majority (76.67 percent) of the dairy farmers expressed that payment of incentive prices should be made on regular basis at an monthly interval (Table 10).

The study indicated deceleration in the number of indigenous cows and buffaloes in the Karnataka state which is a cause of concern while cross bred cows have accelerated over the time period. Increased milk production in cross bred cows was due to increase in their actual number and not because of increase in productivity while indigenous cows and buffaloes exhibited increased production due to increase in productivity is a

welcoming sign. The incentive price of Rs. 5 announced by the Government of Karnataka has resulted in increased milk production and productivity to the tune of 79.90 and 115.22 percent, respectively compared to the years without incentive price. Dairy farmers opined that delay in the payment of incentive prices and its insufficiency are the major flip sides of the scheme.

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