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TYPICAL STUDIES ANALYSIS IN MALWA AND ITS SURROUNDING REGION OF MADHYA PRADESH, INDIA

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ARTICLE INFO **ABSTRACT** **ORIGINAL RESEARCH ARTICLE**

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The OECD and FAO (2012) anticipate the average annual growth rate of global milk production over the coming decade, 2012–21, at 2%. Consumption of dairy products is predicted to increase by approximately 30% by 2021. India and China account for approximately 40% of projected gains. Consumption of dairy and other livestock products provides significant nutritional benefits to many segments of the developing world's population. Rapid development in livestock production and consumption poses problems to human and animal health, the environment, and the economic viability of many impoverished smallholders.

But it may also present chances for small and medium-scale dairy companies. In some parts of western India, dairy farming is intense, with farmers growing irrigated feed crops such as alfalfa. Eastern India, which includes eastern Uttar Pradesh, Bihar, and West Bengal, is largely rural. While arable land is in short supply, biomass is available all year. The average dry matter intake of local cattle in the Indore zone was 8.24 kg/day/animal of which more than half was constituted by dry fodder.

The second largest component of dry matter was concentrates accounting for around 1/4th of total DMI. The daily net cost of maintenance for local cattle was estimated rupees126/animal. It was higher in Ratlam ('rupees 128) as compared to Indore (rupees 111). The variable costs accounted for more than 3/4th of total maintenance cost. The average net cost of maintenance for buffalo was estimated rupees 135–140/animal/day.

The operating cost in the zone was least (rupees 68.95/ animal/day) in case of local cow and highest for buffalo. Low or negative returns in the state for local cattle were also observed. MP (Madhya Pradesh) is 4th in production of the milk in the nation. MP has more female bovine population than many states like Gujarat, Haryana, Karnataka, Bihar and Maharashtra. There is a perfect balance in demand and production of milk in MP.

INTRODUCTION

The milk and dairy products industry's role

The OECD and FAO (2012) anticipate the average annual growth rate of global milk production over the coming decade, 2012–21, at 2%, just slightly less than the 2.1 percent increase seen in the previous decade. The majority of this growth is expected to come from developing countries, with India and China accounting for approximately 40% of projected gains. Consumption of dairy products is predicted to increase by approximately 30% by 2021, owing to growing population, income levels, and the growing influence of retail chains and international corporations, which allow consumer access to such items. Such cross-sectoral relationships demonstrate the importance of an in-depth understanding of the dynamics of India's dairy product distribution and consumption for academic research and policy formulation.[1]

Accelerating milk production growth to meet predicted demand is a critical developmental challenge for India's dairy sector today (Government of India, 2012b). However, how can this growth rate be accelerated? And, even if India achieves the intended levels of milk production, is milk availability symmetrical among regions? More critically, is dairy product consumption evenly distributed across socioeconomic groups? What have been the recent trends in domestic dairy product prices in India? Is it desirable for the livestock population's composition to change? A full study addressing these critical topics is needed, as is an assessment of India's milk and milk product consumption patterns using the most recent available data. Given that the Indian dairy business is highly fragmented and dominated by the unorganised sector, which employs 70 million rural households, it will also be instructive to investigate how the unorganised sector may be transformed into a more organised one. Against this broad backdrop of worries and problems, the present study's modest purpose is twofold. To begin, we will examine important recent structural changes and inequality patterns in the consumption of dairy products in India, and then we will look at supply-side changes in the dairy sector. The concluding study will propose several new strategies for increasing access to milk and milk products.[2]

The significant increase in aggregate consumption of meat and milk is being fueled by millions of people diversifying their diets away from predominantly starch-based diets and toward increasing amounts of dairy and meat. The underlying forces driving these trends are expected to persist, and the potential for increased demand for livestock products remains enormous in large parts of the developing world. Growing consumption of dairy and other livestock products provides significant nutritional benefits to large segments of the developing world's population, even though many millions of people in developing countries continue to lack access to better-quality food.

Due to the additional expense, higher-quality diets are available. However, rapid development in livestock production and consumption poses problems to human and animal health, the environment, and the economic viability of many impoverished smallholders, but may also present chances for small and medium-scale dairy companies.

Milk provides a variety of minerals and contributes significantly to the body's calcium, magnesium, selenium, riboflavin, vitamin B12, and pantothenic acid requirements (vitamin B5). However, milk does not contain enough iron and folate to meet the nutritional demands of developing newborns, and the low iron content is one of the reasons that animal milks are not advised for infants younger than 12 months of age. Food consumption patterns in the United States – the role of cattle and dairy products. [3]

In many sections of the developing world, wealth development and urbanisation are resulting in increased overall food consumption and dietary composition changes, with an increasing share of high-value goods, notably animal products, in the diet. Daily energy consumption per capita in developing nations climbed from 1 861 kcal in 1961 (64 percent of the average in affluent countries) to

2 651 kcal in 2007. (78 percent of the average energy intake in developed countries).

In India, livestock farming is a component of a composite agricultural system defined by interactions between crops and cattle (Singh 2004; Kumar and van Dam 2013). Numerous crop residues, hay, and straw are used into dairy production as inputs, in addition to other inputs for which they bear direct costs (cattle feed, veterinary treatments, and artificial insemination). [4]

Farmers boost soil fertility by using animal dung and urine as inputs (bio fertilisers and bio pesticides). When analysing the economics of cattle husbandry, it is vital to have realistic estimates of the cost of producing bio fertilisers and the economic value of bio pesticides.

Paddy straw and wheat hay, groundnut pods, and the shells of some bean species are frequently used as dry fodder and animal feed. In such cases, a portion of the cost of producing these crops must be allocated to products based on their market value as a percentage of overall yield. When farmers are compelled to purchase these commodities on the open market, cost estimation becomes straightforward.

Often, inputs such as green fodder must be produced, at which point the cultivation cost equals the input cost.

Several of these points are glossed over in the article, which instead presents aggregate input costs and gross revenue data. The extent to which one's own farm's crop leftovers are used to supplement daily animal input is proportional to dairying intensity. In some parts of western India (especially Gujarat), dairy farming is intense, with farmers growing irrigated feed crops such as alfalfa. It is semi-intensive in northern India, with farmers mainly reliant on crop by-products from their own farm to feed their cattle. Eastern India, which includes eastern Uttar Pradesh, Bihar, and West Bengal, is largely rural.[5]

While intensive dairy farming increases milk yield and revenue, it also increases input costs, since farmers must sow green fodder and use expensive cattle feed to maximise milk yield, among other things. While milk yield and revenue are low in traditional dairy farming (which is practised in high rainfall, humid, and sub-humid regions of India), input costs are also low, as animals graze in the wild and farmers rely on natural grasses and crop residues as fodder for animals, supplemented with small amounts of cattle feed. Family members conduct domestic labour for animal rearing. This could be due to the region's particular land and biomass availability. While arable land is in short supply, biomass is available all year. Dairy farming with these inputs has a low opportunity cost and direct cost (Kumar and Singh 2008). Additionally, land scarcity results in surplus family labour that can be productively engaged in animal husbandry; in this situation, market value of labour should be disregarded. [6-10]

This work has been done with aim of evaluating the role of dairy industry in the economics of Madhya Pradesh.

MATERIALS AND METHODS

The goal of this study is to conduct a comparative analysis in order to ascertain the economic impact of dairy on MP's economics.

The survey was conducted using a questionnaire that the participants constructed. A total of 200 milk farmers were surveyed from various MP regions. Milk producers in the M.P. region completed a survey and a questionnaire that provided the data. Hypotheses were tested using a one-sample t-test and a basic linear regression model.

RESULTS AND DISCUSSION:

Typical studies that has been analyzed in the Dairy Industrial Area (DIA) i.e. Malwa and its surrounding regions. Feed consumption pattern: Feed consumption pattern for different categories of animals on dry matter basis (DMI) is given in Figure 2. The average dry matter intake of local cattle in the zone was 8.24 kg/day/animal of which more than half was constituted by dry fodder. In a study, Mudgal et al. (2003) found that the straw supplied 62.23% of DM and 50.10% of TDN requirement of animals. The second largest component of dry matter was concentrates accounting for around 1/4th of total DMI. The intake of concentration in total was higher in the zone as compared to state average ranging from 1.58 kg to 1.99 kg/day/animal on fresh

matter basis. The major dry fodders in the zone were wheat straw, soybean straw, maize stalk, sorghum stalk and gram straw while the major green fodders fed were maize, jowar, barseem and bajra in summer, maize, sorghum and collected grasses in rainy season and barseem and lucerne in winter season. The major concentrates fed were cottonseed cake, cotton seed, readymade Sudana ration, chunies of maize, soybean and gram, etc. The farmers who were selling milk to Cooperatives or private milk centre, they supply the readymade concentrate mixture of different companies to the farmers. The intake was comparatively higher in Indore district and the composition was also different in the district. It was by and large balance containing dry fodder, green fodder and concentrates. However, in Ratlam district of region, the green fodder was less (0.80 kg/animal/day). Overall as well as in Ratlam district, the intake was more in rainy season followed by winter and summer season. The higher intake in rainy season may be due to easily availability of green fodder. The average dry matter intake of crossbred cattle in the region was estimated 10.34 kg/day/animal of which highest was contributed through dry fodder (6.04 kg) followed by concentrates (2.65 kg) and green fodder (1.42 kg). Overall in the region, the intake was almost same in rainy and winter season. However, the proportion of green fodder and concentrates was more in rainy season as compared to winter season. In Indore district, the average DMI was highest in summer season followed by winter season while in Ratlam district, it was highest in rainy season followed winter season. The overall average DMI of buffalo in the region was 10.58 kg/day/animal. It was highest in winter season (11.39 kg) and lowest in summer season (10.09 kg). The similar pattern was observed across the districts of region. However, the composition was considerably different. Indore district, the consumption of green fodder was more as compared to Ratlam, while in Ratlam, concentrates were more. In nutshell, it was found that there was misallocation of livestock feed resources. The low productive local cattle were fed almost equal quantity of concentrated and green fodder as it was fed to high productive cross-bred cattle and buffalo. The misallocation of livestock feed resources was also reported in the earlier studies (Sharma et al. 2014).

Table 1: Feed consumption pattern for different categories of animals (DMI in kg/animal/day)

DMI source	Indore				Ratlam				Malwa agro-climatic zone			
	Summer	Rainy	Winter	Overall	Summer	Rainy	Winter	Overall	Summer	Rainy	Winter	Overall
					Local cattle							
Dry fodder	5.48	2.35	5.98	4.04	3.92	5.81	4.95	4.74	4.56	3.78	5.24	4.43
Green fodder	1.44	3.4	0.79	2.29	0.78	1.01	0.64	0.80	1.05	2.41	0.68	1.47
Concentrates	2	2.42	1.35	2.11	1.77	2.26	2.09	2.00	1.86	2.35	1.88	2.05
Grazing	0	0.21	0	0.1	0.83	0.00	0.35	0.46	0.49	0.12	0.25	0.30
Total	8.92	8.38	8.12	8.54	7.30	9.08	8.04	8.00	7.97	8.67	8.06	8.24
					Crossbred cattle							
Dry fodder	6.34	2.97	7.34	5.64	5.30	6.62	6.72	6.25	5.60	4.91	6.92	6.04
Green fodder	1.30	4.05	0.81	2.01	1.27	1.42	0.86	1.11	1.28	2.65	0.84	1.42
Concentrates	3.13	2.58	2.18	2.54	2.68	3.09	2.58	2.71	2.81	2.85	2.45	2.65
Grazing	0.00	0.00	0.24	0.10	0.63	0.00	0.19	0.29	0.45	0.00	0.21	0.22
Total	10.77	9.60	10.58	10.30	9.89	11.13	10.35	10.36	10.14	10.41	10.42	10.34
					Buffalo							
Dry fodder	6.92	3.32	7.76	6.30	5.42	7.02	7.05	6.50	6.13	5.82	7.21	6.43
Green fodder	1.37	3.90	1.20	1.90	1.13	0.89	0.99	1.01	1.24	1.86	1.04	1.32
Concentrates	1.86	3.30	2.40	2.30	1.85	2.22	3.14	2.48	1.85	2.57	2.97	2.42
Grazing	0.00	0.00	0.31	0.07	1.63	0.00	0.13	0.60	0.86	0.00	0.17	0.41
Total	10.15	10.51	11.67	10.57	10.03	10.14	11.32	10.59	10.09	10.26	11.39	10.58

Table 2: Maintenance cost of animal and milk production (Local Cow)

Cost component	Indore				Ratlam				Malwa agro-climatic zone			
	Rainy	Winter	Summer	Annual	Rainy	Winter	Summer	Annual	Rainy	Winter	Summer	Annual
CRC on fixed assets	5.7	3.69	8.15	5.85	7.69	6.54	9.00	7.74	8.65	6.53	5.74	7.22
CRC on animal	21.34	15.01	33.32	23.22	20.98	21.53	20.71	21.07	25.92	21.19	19.7	22.8
Land rent	0.06	0.12	0.06	0.08	0.03	1.3	0.31	0.55	0.21	0.05	0.97	0.32
Total fixed cost	27.10	18.82	41.53	29.15	28.70	29.37	30.02	29.36	34.78	27.77	26.41	30.34
Dry fodder	9.76	18.29	20.93	16.33	21.47	14.95	15.44	17.29	17.71	14.62	15.89	16.17
Green fodder	16.65	6.12	9.86	10.88	10.24	9.21	10.01	9.82	9.95	13.99	8.34	11.07
Grazing	0.82	0.00	0.00	0.27	0.00	1.92	3.45	1.79	2.03	0.48	1.38	1.32
Concentrate and supplements	44.01	25.19	30.66	33.29	43.01	37.53	27.39	35.98	30.77	44.08	35.45	36.69
Total feed cost	71.24	49.60	61.45	60.76	74.72	63.61	56.29	64.87	60.46	73.17	61.06	65.25
Hired Labour	6.11	0.00	0.00	2.04	4.24	1.66	4.41	3.44	2.59	5.33	1.2	3.28
Family Labour	37.27	29.05	26.88	31.07	27.63	39.75	61.77	43.05	47.36	33.27	36.75	39.84
Veterinary and miscellaneous expenses	1.54	2.02	2.47	2.01	1.96	0.93	1.76	1.55	2.05	1.71	1.24	1.74
Total variable cost	116.16	80.67	90.80	95.88	108.55	105.95	124.23	112.91	112.46	113.48	100.25	110.11
Gross cost	143.26	99.49	132.33	125.03	137.25	135.32	154.25	142.27	147.24	141.25	126.66	140.45
Value of dung	14.68	12.06	12.72	13.57	12.18	15.62	15.36	14.39	14.27	13.64	14.62	14.12
Net cost	128.58	87.43	119.61	111.46	125.07	119.70	138.89	127.89	132.97	127.61	112.04	126.33
Milk yield (l/day)	6.06	3.14	5.95	5.05	5.86	5.64	4.41	5.30	5.05	5.98	4.94	5.36
Cost of milk production (`/l)	21.22	27.84	20.10	22.07	21.34	21.22	31.49	24.11	26.33	21.34	22.68	23.57

Table 3: Maintenance cost of animal and milk production (Buffalo)

Cost component	Indore				Ratlam				Malwa agro-climatic zone			
	Rainy	Winter	Summer	Annual	Rainy	Winter	Summer	Annual	Rainy	Winter	Summer	Annual
CRC on fixed assets	6.22	4.6	3.91	4.91	6.04	6.16	7.03	6.41	6.13	6.12	5.67	5.91
CRC on animal	67.42	50.2	44.28	53.97	52.41	55.41	53.87	53.90	51.09	59.45	53.76	54.38
Land rent	0.02	0.64	0.04	0.23	0.04	0.3	0.19	0.18	0.15	0.03	0.41	0.24
Total fixed cost	73.66	55.44	48.23	59.11	58.49	61.87	61.09	60.48	57.37	65.60	59.84	60.53
Dry fodder	13.02	24.3	24.2	20.51	24.29	22.1	20.41	22.27	21.51	19.01	22.80	21.48
Green fodder	19.17	10.63	15.66	15.15	11.51	10.45	17.64	13.20	17.07	15.10	10.51	13.55
Grazing	0.00	1.33	0.00	0.44	0.00	1.04	3.17	1.40	2.25	0.00	1.13	1.18
Concentrate and Supplements	43.63	34.98	54.88	44.50	45.89	43.24	43.86	44.33	47.05	44.83	40.62	43.54
Total feed cost	75.82	71.24	94.74	80.60	81.69	76.83	85.08	81.20	87.88	78.94	75.06	79.75
Hired labour	0.00	0.31	0.00	0.10	5.46	7.21	0.73	4.47	0.52	2.90	5.02	3.18
Family labour	48.22	42.10	39.92	43.41	42.75	28.27	49.60	40.21	46.80	45.31	32.65	39.90
Veterinary and miscellaneous expenses	2.68	2.18	2.51	2.46	2.65	2.38	1.91	2.31	2.08	2.66	2.32	2.33
Total variable cost	126.72	115.83	137.17	126.57	132.55	114.69	137.32	128.19	137.28	129.81	115.05	125.16
Gross cost	200.38	171.27	185.40	185.68	191.04	176.56	198.41	188.67	194.65	195.41	174.89	185.69
Value of dung	14.00	15.98	14.95	14.98	15.09	15.03	20.46	16.86	18.87	14.58	15.33	16.18
Net cost	186.38	155.29	170.45	170.71	175.95	161.53	177.95	171.81	175.78	180.83	159.56	169.51
Milk yield (l/day)	7.47	7.63	7.18	7.43	8.02	7.49	7.63	7.71	7.50	7.76	7.53	7.58
Cost of milk Production (₹/l)	24.95	20.35	23.74	22.99	21.94	21.57	23.32	22.27	23.44	23.30	21.19	22.36

Cost of milk production

Local cattle: The seasonal and annual estimate of cost of milk production from local and crossbred cows and buffaloes has been given in Figure 3 and 4. The daily net cost of maintenance for local cattle was estimated rupees126/animal. It was higher in Ratlam (`rupees 128) as compared to Indore (rupees 111). The variable costs accounted for more than 3/4th of total maintenance cost. Among the variable costs, the feed was major constituent followed by labour. The maintenance cost was lowest in winter season. The high cost of maintenance in Indore was because of higher fixed costs while in Ratlam it was both because of high labour cost as well

as high fixed costs. The possible reason of high labour cost may be due to lean season the entire family labour engages in diary operations. The cost of production was higher (rupees 24.11/l) in Ratlam as compared to Indore.

Crossbred cattle: The daily net cost of maintenance for crossbred cattle in Malwa region as a whole was estimated rupees 170/animal and it was almost same in both the districts (Figure 4). Feed cost accounted highest (42.95%) followed by fixed costs (32.59%) and labour cost (23.20%). The proportion of feed costs in total cost was relative higher in summer season due to higher prices of feed and fodder. The findings differs from the study conducted by Kumari *et al.* (2016) in Bihar where it was found that the cost of production was more in winter than summer and rainy may be due to difference in feeding patter. The cost of milk production for crossbred cattle in the region was estimated to be about rupees 22–23.

Buffalo: The average net cost of maintenance for buffalo was estimated rupees 135–140/animal/day. In a study of Indore district of Madhya Pradesh, Verma (2007) estimated maintenance cost of rupees 21,368 which comes around rupees 59/ day.[12] It indicates that maintenance cost is increasing very rapidly during the period. A recent study by Sharma (2013) on economics of buffalo dominated commercial dairy farmers reported higher maintenance cost (up to rupees 207/day/ animal) as well as cost of milk production (up to rupees 34.39/l).

As compared to local cattle and buffalo, the share of feed cost was higher in buffalo and accounted for more than ½ of the total maintenance cost. The labour cost was also higher for buffalo in comparison to two other species.

Income measures: 5 present the various income measures for local cattle, crossbred cows and buffaloes in the region. The operating cost in the zone was least (rupees 68.95/ animal/day) in case of local cow and highest for buffalo (rupees 89.50/day). As against this, the net economic margins were highest in Buffalo (rupees 5.03/l) and least in local cow (rupees0.62/l). Low or negative returns in the state in case of local cattle were also observed in earlier study by Sharma (2013).

Several authors had reported negative net returns from milk production in case of indigenous cows of other states also (Nagrale *et al.* 2007, Singh and Agrawal 2007, Bhowmick and Sirohi 2008, Bardhan and Sharma 2012, Singh *et al.* 2012, Chand and Sirohi 2012, Jaiswal and Singh 2015).

Though the gross return was higher in case of crossbred cattle as compared to buffalo, the net economic margin was low due to higher capital cost on the one hand and low price of milk on the other.

Policy implication: The average dry matter intake of buffalo in the region was estimated highest (10.58 kg/day/ animal) followed crossbred cattle (10.34 kg/day/animal) of which more than half was contributed by dry fodder. The availability of green fodder in summer and winter season was comparatively low. Emphasis need to be given on dual purpose verities, quality seed of fodder crops and improving small farm mechanisation fodder crops. The net maintenance cost was highest in case of crossbred cattle and lowest for local cattle. Feed cost was accounted major portion in the total variable cost ranging from 57% in case of local cattle to 64% in case of buffalo. Cost of milk production was estimated rupees 23.57, rupees 22.36/l and rupees 24.84, respectively for local cattle, crossbred cattle and buffalo.

Computation of different income measures revealed that dairying in the region is more profitable for farmers maintaining buffaloes in the herd. Maintaining of local cattle is not profitable in long run as prices are very low. To make dairying more remunerative, price is a very important factor to consider as it often acts as an incentive for farmers to scale up their production. As the case of crop sector, there is need to have minimum support price policy for milk also.

This would enable linking of milk production cost with quality of milk and hence guarantee remunerative price to the producers as well as provide enough incentives to them in producing milk of adequate quality.

Table 4: Annual cost and returns from milk production in Malwa region of MP

Particular	Local cow	Crossbred cow	Buffalo
Operating cost (₹/day)	68.95	84.08	89.50
Capital cost (₹/day)	30.02	60.29	28.53
Opportunity cost (₹/day)	41.48	41.32	35.64
Gross cost (₹/day)	140.45	185.69	153.67
Gross returns (₹/day)	143.65	205.00	181.36
Cost of milk production (₹/l)	23.57	22.36	24.84
Sale price of milk (₹/l)	24.91	24.91	29.89
Milk yield (l/day)	5.20	7.58	5.50
Cash farm income (₹/day)	74.70	120.92	91.86
Farm income (₹/day)	44.68	60.63	63.33
Entrepreneurs' profits (₹/day)	3.20	19.31	27.69
Gross margin (₹/l)	14.37	15.95	16.70
Net margin (₹/l)	8.59	8.00	11.51
Net economic margin (₹/l)	0.62	2.55	5.03

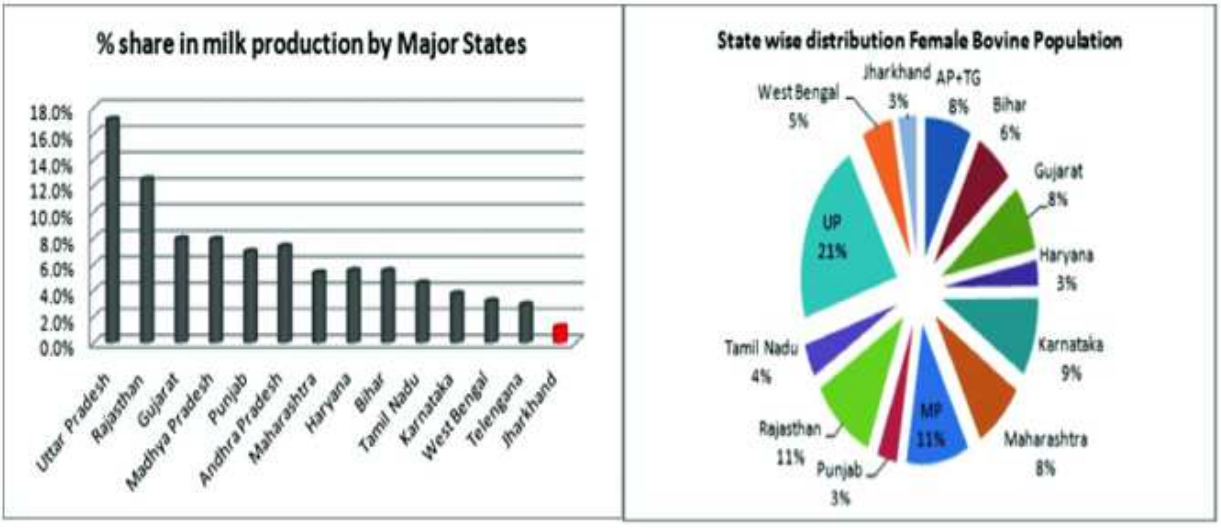

Figure 1. Percent share in milk production in Major states and State wise distribution Female Bovine Population.

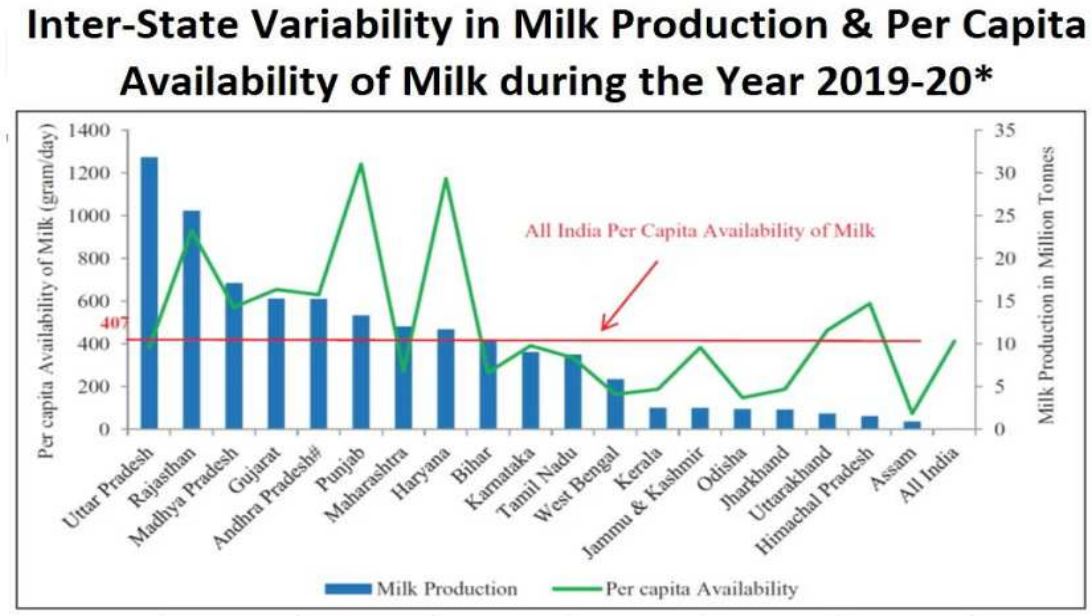

Figure 2: Supply and demand of the milk in India in 2019-20

In a study in year 2019 it was observed that the MP is 4th in production of the milk in the nation. In the female bovine population state of MP is significantly more as compare to many states like Gujarat, Haryana, Karnataka, Bihar and Maharashtra.

In a study in year 2019-20 it was observed that the MP has a balanced ration of Milk production and availability of the milk, thus giving us the impression that there is a perfect balance in demand and production of milk in MP.

In last we can conclude that there is a perfect balance in demand and production of milk in MP.

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