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Research Paper

Perspectives and prospects of milk production in Western Maharashtra

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ABSTRACT : The present study examines the status of livestock, infrastructure and milk production in Maharashtra with special reference to western Maharashtra on the broad indicators of dairy development activities like livestock population, animal husbandry, veterinary facilities, breeding and health cover programmes. The dairy development in western Maharashtra and Maharashtra state was studied with the help of linear and compound growth rates for the various selected parameters. The population of less productive bovine (indigenous cattle and male cattle) has declined whereas that of productive animals like crossbred cows has increased. The population of ovines (like sheep and goat) has increased at faster rate compared to bovines. The different indicators of livestock development programme *viz.*, artificial insemination, number of cases treated, vaccinations, number of veterinary aid centres and development of infrastructure such as hospitals, polyclinics and mobile vans, etc. have made progress over the period of time. The total milk production showed the increasing trend in western Maharashtra and the state as a whole.

KEY WORDS : Milk production, Prospectives, Prospects, Livestock population

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INTRODUCTION

Dairying is one of the important subsidiary occupations in rural areas of India, next only to agriculture. Dairy development has assumed a position of paramount importance in the rural economy of India because of its immense potential for supplementing the income of small, marginal farmers and landless agricultural laborers for augmenting the employment and income of the rural people. Dairy development in India has taken place under a well known programme known as "Operation flood". Co-operative and private dairy being an integral part of the "Operation flood programme", have played a major role in the production and marketing of milk.

India ranks first in the world and Maharashtra ranks with sixth in India for milk production. The production of milk at the State level was 87.34 lakhs tons and the per capita daily availability was 209 g, while the production of milk at all-India level was 132 million tons and the per capita daily availability was 290 g during the year 2013.

In Maharashtra state, the share of animal husbandry in Gross State Domestic Products of agriculture and allied activity during the year 2012-13 was 24 per cent. The total livestock in the state was 3.72 crore in the year 2013. State has made a remarkable progress in milk production through the introduction and maintenance of crossbred cows and establishment of co-operative and private dairy units aimed at selling milk and milk products at remunerative prices (Kaware, 2011 and Raskar, 1996). The dairy industry has witnessed the increase in livestock population and milk production particularly in western Maharashtra. The milk production in Maharashtra state and western Maharashtra was 87.34 lakhs tones and 50.48 lakhs tons during the year 2012-13, respectively. The share of western Maharashtra in the state was 60.72 per cent. The per capita availability of milk in Maharashtra was 58 g/day in the year 1970-71 and it increased to 206 g/day per capita in the year 2012-13 against the per capita requirement of 290 g/day as per nutritional standards (ICMR). With this background, the

present study attempted to analyze the perspectives and prospects of milk production in western Maharashtra.

Objectives :

– To asses the growth of livestock population and dairy development activity.

– To examine the growth in the pre-requisite infrastructural parameters.

– To study the changes in the milk production and procurement by milk organizations.

MATERIALS AND METHODS

Secondary data were utilized published by various Govt. agencies on the broad indicators of dairy development activities like livestock population, animal husbandry, veterinary facilities, breeding and health programme. The data on total livestock population, milk production and number of dairy co-operative societies were collected from Department of Animal Husbandry, Dairy Development, Co-operation and Agriculture, Livestock Census reports (1982 to 2007) and Animal Husbandry Statistical Booklet reports of the State. The dairy development in western Maharashtra and Maharashtra state was studied with the help of linear and compound growth rates of the various selected parameters.

The compound growth rates was estimated and tested for its significance with 't' test. Growth rates of milch animals, livestock population were computed for the livestock census years 1982, 1987, 1992, 1997, 2003 and 2007.

RESULTS AND DATA ANALYSIS

The findings of the present study as well as relevant discussion have been presented under the following heads :

Growth of livestock :

Censuswise growth composition of livestock of Maharashtra state and western Maharashtra at different time periods is indicated in Table 1. The total livestock population of Maharashtra increased from 309.20 to 372.28 lakhs during the period from 1982 to 2007, whereas in western Maharashtra, it increased from 130.07 lakhs to 169.67 lakhs during the year 1982 to 2002. The cattle constituted nearly 45 to 52 per cent of the total livestock population of the state during the different time periods. Sheep and goat together shared nearly 34 to 37 per cent of the total livestock population in Maharashtra and in western Maharashtra, it ranged between 42 to 45 per cent. Bullocks are important source of power to agriculture and their share in the total livestock ranged between 22 to 23 per cent and 16 to 17 per cent in Maharashtra and in western Maharashtra, respectively. Total buffaloes accounted for 13 to 16 per cent and 15 to 19 per cent of the total livestock in Maharashtra and western Maharashtra, respectively. The population of the cattle was excessively higher than that of the buffaloes during different time periods but crossbred cattle population increased at a faster rate of growth rate and it has accelerated over the time period. The crossbred cattle have virtually replaced the indigenous cattle.

The population of sheep and goat increased from 103.76 to 142.48 lakhs and 54.37 lakhs to 75.69 lakhs during the period from 1982 to 2007 in Maharashtra and from 1982 to 2003 in western Maharashtra, respectively. Moreover, the population of sheep and goat has also increased substantially during the period under study. Sheep and goat are considered to be the productive and income generating assets of small, medium and large herd size farmers in the rural areas. The increase in buffalo population was more faster than that of cattle, mostly because of wide spread adoption of A.I. and buffalo breeding programme in the State, in general and that in western Maharashtra in particular, under 'Operation flood programme' implemented by the Government of Maharashtra from the year 1973. Relatively higher growth rates were observed in crossbred cattle than indigenous cattle in western Maharashtra and Maharashtra as a whole confirmed that crossbred cows are preferred over indigenous cows for milk production in state because of agro-climatic conditions are favourable for rearing the crossbred cows.

Growth in milk production :

The total milk production showed an increasing trend in western Maharashtra and Maharashtra state over the period from 1981-82 to 2012-13. During the period of 1981-82 to 2012-13, the share of milk production of western Maharashtra to the state ranged between 57 to 63 per cent while, the share of Maharashtra to India ranged between 5 to 8 per cent due to large number of upgradation of indigenous milch cattle and increased productivity (Table 2).

The total milk production in the state had increased from 19.09 to 87.34 lakhs tons from the year 1981-82 to 2012-13. The increase in production of milk had been more than the threefold in 32 years. The rate of growth of milk production increased at a faster rate *i.e.* 4.45 per cent during the period of 1981-82 to 2012-13. This was due to the fact that the impact of the development of improved breeding technology of cattle and buffaloes population resulting into increased milk production in the Maharashtra state. Dairying in Maharashtra is well established due to assured market, reasonably good prices for milk and easy access to health services.

The total milk production from bovines for the state, during the year 2012-13 was estimated as 87.34 lakhs tons, of which 13.34 lakhs ton (15 %) was from indigenous cows while 33.31 lakhs ton (38 %) was contributed by crossbred cows and remaining 43 per cent was from buffalo. The average milk yield per day/ indigenous cow in milk was 1.70 kg, for exotic/cross bred cow in-milk, it was 6.62 kg and in the case of buffalo, the

Table 1 : Growth of livestock in western Maharashtra and Maharashtra ('000')

Sr. No.	Particulars	1982		1987		2002		2007	Per cent change over base year	
		WM	MS	WM	MS	WM	MS	MS	WM	MS
A	Cattle									
	(a) Adult male									
	Indigenous	2246	6687	2704	6690	2336	7784	7709	4.01	15.28
	Crossbred	NA	73	NA	158	297	543	570	29.69	680.82
	Total adult male	2246	6760	2704	6848	2633	8327	8279	17.23	22.47
	(b) Adult female									
	(1) Indigenous									
	(i) In milk	759	2103	962	2492	620	2832	1959	-18.31	-6.85
	(ii) Dry	1034	3083	988	3174	472	1667	1324	-54.35	-57.05
	Total female	1815	5247	1975	5739	1714	5784	5413	-5.56	3.16
	(2) Crossbred									
	(i) In milk	NA	129	NA	350	709	937	1105	75.50	756.58
	(ii) Dry	NA	41	NA	125	326	459	483	69.79	1078.05
	Total female	NA	214	NA	580	1639	2299	2567	67.07	1099.53
	(c) Young stock	1411	4433	1882	5020	1652	4891	4373	17.08	-1.35
	(1) Indigenous	1411	4228	1882	4555	936	3986	3220	-33.66	-23.84
	(2) Crossbred	NA	205	NA	465	716	905	1153	52.99	462.44
	Total cattle (I)	5472	16654	6940	18186	5985	16738	16259	9.38	-2.37
	(1) Indigenous	5472	16162	6940	16983	4050	13568	13121	-25.99	-18.82
	(2) Crossbred	NA	492	NA	1203	1935	2898	3138	59.92	537.80
B.	Buffalo									
	(a)Adult male	103	351	154	343	357	892	907	246.60	158.40
	(b) Adult Female									
	(i) In milk	675	1262	831	1597	1273	2252	2351	88.59	86.29
	(ii) Dry	505	1017	560	1192	569	1090	1018	12.67	0.09
	Total female	1193	2307	1975	5739	2813	5153	5401	135.80	124.11
	(c) Young stock	631	1313	1312	1582	1125	2220	2320	78.29	76.69
	Total buffalo (II)	1927	3972	2269	4752	3171	6084	6308	64.56	58.81
	Total bovine	7399	20133	9199	21738	9157	22377	22568	23.76	12.09
C.	Total sheep	2014	2671	2089	2873	2419	3175	3258	20.11	21.98
D	Total goat	3423	7705	3957	9195	5150	10449	10990	50.45	42.63
E.	Total livestock	13007	30920	15405	34252	16967	37058	37228	30.45	20.40
F.	Poultry birds	9783	19844	13985	24839	21916	38926	23228	124.02	17.05

Source : Livestock Census Reports of Maharashtra, 1982 to 2007 (N.A. Not available)
(WM: Western Maharashtra and M.S. Maharashtra state)

Table 2 : Growth in milk production (Lakhs ton)

Sr. No.	Year	WM	MS	India	Per cent share of	
					WM to MS	MS to India
1.	1981-82	10.88	19.09	343.00	56.99	5.57
2.	1986-87	14.26	24.59	461.00	57.99	5.33
3.	1991-92	22.55	39.55	557.00	57.02	7.10
4.	1996-97	30.37	51.27	685.81	59.24	7.48
5.	2001-02	36.71	60.93	844.00	60.25	7.22
6.	2006-07	43.78	69.78	1009.00	62.64	6.92
7.	2013-13	50.54	87.34	1324.00	57.86	6.59
	CGR (%)	6.12***	4.45***	5.03***	-	-

WM- western Maharashtra MS- Maharashtra state
Source: Various reports of deptt. of Animal Husbandry, Maharashtra state (1982-2013)
*** indicates of significance of values at p=0.01, respectively

Table 3 : Growth rates of livestock and milk production (%)

Sr. No.	Particulars	WM (1982 to 2002)		Maharashtra state (1982 to 2007)	
		LGR	CGR	LGR	CGR
1.	Indigenous cattle				
	(i) Breeding males	32.81 NS	18.24 NS	37.95***	24.20***
	(ii) In-milk cows	5.81NS	6.83 NS	5.65**	5.31**
	(iii) Breedable cows	14.13***	23.48***	0.54 NS	0.55 NS
	(iv) Calves	13.75 NS	21.61 NS	2.60*	1.25*
2.	Crossbred cattle				
	(i) In-milk cows	84.14***	22.97***	132.98***	49.03***
	(ii) Breedable cows	30.39***	16.36***	707.0***	61.88***
	(iii) Calves	18.36**	12.20**	70.06***	38.83***
3.	Buffalo				
	(i) In-milk buffaloes	22.73***	17.59***	16.45***	13.13***
	(ii) Breedable Buffalo	2.80*	2.73*	8.65**	7.96**
	(iii) Heifers	26.11***	19.03*	14.68***	12.04***
	Total buffalo	16.92***	13.97***	10.89***	9.44***
4.	Total cattle	0.88 NS	1.06 NS	0.06 NS	0.04 NS
5.	Total sheep	6.78**	6.24**	4.25**	4.02**
6.	Total goat	13.62*	12.35*	7.37**	6.78**
7.	Total livestock	4.32 NS	4.18 NS	3.75*	3.63*
8.	Milk production	8.22***	6.12***	6.58***	4.45***
	(i) Indigenous cow	0.20 NS	0.21 NS	0.83 NS	0.87 NS
	(ii) Cross bred cow	20.33***	11.58***	16.80***	9.09***
	(iii) Buffalo	6.15***	4.47***	5.58***	4.44***
	(iv) Goat	2.57**	2.47**	3.65***	3.15****
9.	Av. milk yield				
	(i) Indigenous cow	11.49***	12.43***	12.04***	10.18***
	(ii) Cross bred cow	4.43*	7.59*	4.82*	3.27*
	(iii) Buffalo	10.57***	13.16***	12.26***	10.25***
	(iv) Goat	5.14***	2.87***	3.58**	3.26**
10.	Per capita availability of milk	-	-	27.52***	19.56***

***, ** and * indicates of significance of values at p=0.01, 0.05 and 0.1, respectively

NS = Non- significant

same was 3.59 kg, respectively (Animal Husbandry Integrated Survey Scheme Report, 2013).

India ranked first in the world in milk production and buffaloes contributed about 51 per cent while, cows contributed about 45 per cent of the total milk production in the year 2013.

Growth rates of livestock and milk production :

The five years growth rates of livestock, average milk yield and milk production in Maharashtra and western Maharashtra are shown in Table 3. The censuswise growth rates of livestock obtained by exponential function from census year 1982 to 2007 of crossbred cows in-milk, cross bred breedable cow, in-milk buffalo and total buffalo were highly significant, *i.e.* 22.97 and 49.03, 16.36 and 61.88, 17.59 and 13.13, 13.97 and 9.94 per cent, respectively in western Maharashtra and the State as a whole. Likewise, the growth rates of crossbred calves, buffalo calves, total sheep and total goat have increased at the rate of 12.20 and 38.83, 19.03 and 12.04, 6.24 and 4.02, 12.35 and 6.78 per cent, respectively (Kalyankar, 1998 and Kalyankar *et al.*, 1998).

The growth rates of total milk production from, crossbred cows milk, buffalo milk, goat milk production, average milk yield per animal per day of indigenous cow and buffalo increased during the study period in western Maharashtra and Maharashtra. The growth rate in per capita availability of milk in Maharashtra had also increased by 19.56 per cent. Because of the introduction of crossbreeding programme in cows with exotic bulls like Holstein- Friesian and Jersey has become the pivot to the country's phenomenal increase in milk production.

The growth rates of various indicators *viz.*, milk production (6.12) and average milk yield of various species of milk animals *viz.*, indigenous cows (12.43 %), crossbred cows (7.59 %) and buffaloes (13.16 %) etc., in western Maharashtra indicated that those were higher than State (Table 3).

Growth of animal husbandry activities :

The information on indicators of livestock development programme such as artificial insemination (AI), number of cases treated, special visits, supply of medicines etc and development of infrastructure such as hospitals, dispensaries, polyclinics and mobile vans is given in Table 4.

It is evident from Table 4 that the number of Artificial

Table 4 : Growth of animal husbandry activities in western Maharashtra and Maharashtra (Number)

Sr. No.	Particulars	1980-81	1990-91	2012-13		Per cent change in WM over 1990-91	Per cent change in MS over 1980-81
		MS	WM	WM	MS	WM	MS
1.	A.I. done ('000')	439	759	1402	2188	84.71	398.41
2.	Crossbred calves born by A.I. ('000')	77	241	458	690	90.04	796.10
3.	Pregnancy tested ('000')	1214	826	943	1559	14.16	28.42
4.	Infertility tested ('000')	278	186	238	587	27.95	111.15
5.	Cases treated ('000')	7356	4128	7365	16758	78.41	127.81
6.	Medicine supplied at home ('000')	189	157	950	1312	505.09	402.65
7.	Operations done ('000')	345	370	299	831	-19.19	140.87
8.	Vaccinations done (lakhs)	255	204	228	576	11.76	125.87
9.	Veterinary hospitals	29	9	9	9	-	-
10.	Veterinary polyclinics	769	515	638	1566	23.88	103.64
11.	Mobile veterinary dispensaries	26	10	46	65	360.00	150.00
12.	Veterinary aid centers	1541	625	903	2392	44.48	55.22
13.	Group discussion camps organized	178	98	676	2758	589.79	1449.44
14.	Farmers trained	5478	2731	10153	67849	271.77	1138.57
15.	Fodder seed distribution (ton)	180	976	207	421	-78.79	133.88
16.	Fodder grass set distributed (lakhs)	17	21	79	155	276.19	811.76

Source: Various Animal Husbandry Statistical Booklets, 1981 to 2013

Table 5 : Milk milk yield of different species of milk animals in Maharashtra

Sr. No.	Particulars	Maharashtra	India	Average productivity Lit./ day	
				Maharashtra	India
1	Milk production (lakhs ton)	13.35 (15.29)	275.46 (20.80)	1.70	2.20
	i) Indigenous cow				
	ii) Crossbred cow	33.31 (38.14)	321.27 (24.26)	6.62	6.63
	iii) Buffalo	37.70 (43.17)	677.64 (51.17)	3.59	4.58
	iv) Goat	2.96 (3.39)	49.94 (3.77)	0.21	0.40
	Total	87.34 (100.00)	1324.31 (100.00)	-	-

Figures in parentheses are the percentages to the total quantity
Source : Animal Husbandry Statistical Booklet, 2006-07

Insemination (A.I) done increased tremendously *i.e.* from 4.39 lakhs in 1981 to 21.88 lakhs during the year 2013 however, the number of crossbred calves born by A.I. were only 77,000 which has increased to 6,90,000 during the corresponding period. The rate of success of breeding through A.I. was only 17.54 per cent in the year 1981 which has increased to 31.53 per cent. This indicated the very high rate of growth of this particular activity. The number of pregnancy and infertility tested increased by 28.42 and 111.15 per cent, respectively over the base year 1980-81. In the case of number of cases treated increased (127.81 %), same trend was observed in the case of medicine supplied at home (402.65 %). The number of vaccinations done increased from 255 lakhs in the year 1981 to 576 lakhs during the year 2013, respectively. There was no substantial increase in the veterinary hospitals during the study period. However, the increasing trend was observed in case of number of veterinary polyclinics and dispensaries and veterinary aid centres. Since the information of western Maharashtra for the year 1980-81 was not available for all these parameters, therefore, the results were presented from 1990-91 onwards. The number of A. I. done increased from 7,59,000 to 14,02,000 in the period from the year 1991 to 2013, whereas the number of calves born by A.I. increased from 2,41,000 to 6,90,000. The number of pregnancy tested and infertility tested increased by 14 and 28 per cent, respectively during the period from 1991 to 2013, while the number of cases treated were 73,65,000 in the year 2013.

Milk productivity :

The data related to milk yield in Maharashtra are given in Table 5.

Efforts of the Government of Maharashtra have resulted into establishment of 73 processing plants with an aggregate processing capacity of 76.62 lakhs litres per day. Besides, these processing plants, there were 125 government / co-operatives milk chilling centers, with a aggregate capacity of 22.96 lakhs litres per day. The average daily collection of milk by government and co-operative dairies taken together in (excluding greater Mumbai) Maharashtra state during in the year 2008-09 was 38.57 lakhs litres (Economic Survey, 2012-13). Similar type of investigation has also been also carried out by Singh *et al.* (2005), Dayakar and Hyma (2005) and Dayakar and Hyma (2006).

The total milk production from bovines in Maharashtra in the year 2013 was estimated to 87.34 lakhs tons of this, the contribution from cows was 53.43 per cent (indigenous and crossbred cows), 43.17 per cent from buffaloes and remaining 3.39 per cent was from goat. The average milk yield per day / indigenous cow milk was 1.70 litre and that of exotic/ cross bred cow in-milk was 6.62 litres, while in the case of buffalo, the same was 3.59 litres and goat was 0.21 litres (Table 5). Borude *et al.* (1993), Gavali (2001) and Kalamkar (2004) have contributed some information related to the present investigation.

Conclusions :

The population of less productive bovine (indigenous cattle and male cattle) has declined, whereas that of productive animals like crossbed cows has increased. The population of ovines (sheep and goat) has increased at more faster rate compared to bovines. Between two species, goat population has increased faster than sheep population indicating increased importance of goat for meat production. The total milk production showed an increasing trend in western Maharashtra and the State as a whole, over the period of time. The proportionate share of milk production of western Maharashtra to the state ranged between 53 to 63 per cent, while the share of Maharashtra state to India ranged between 5 to 8 per cent and this was due to conversion of large number of indigenous milch cattle into high yielding breeds (crossbred) and increased productivity. The growth rates of in-milk crossbred cows and in-milk buffalo, breedable cows, calves, breedable buffalo and heifers were highly significant per census in western Maharashtra and the state as a whole. Likewise, the growth rates of total sheep, goat, and in-milk cow and total buffalo increased during different livestock census in western Maharashtra and Maharashtra. The growth rate in per capita availability of milk in Maharashtra had also increased by 19.56 per cent. The different indicators of livestock development programme such as A. I., cases treated, vaccinations, number of veterinary aid centres and development of infrastructure such as hospitals, polyclinics and mobile vans, etc. have made progress over the period of time.

Policy implication :

The programme of crossbreeding has not been uniformly effective across the different categories of farms. Hence, there is a need to have long-term appropriate breeding policy including timely delivery of livestock services. The milk production has increased over a period of time with fluctuations yearly. There is a need to establish more number of the milk processing units on private and co-operative basis so as to reap the renenumerative market prices for the milk and milk products and inturn, the consumers will be benefited through quality milk at reasonable prices.

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