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ROLE OF BOVINE POPULATION IN MAHARASHTRA'S
ECONOMY WITH SPECIAL REFERENCE TO
MILK PRODUCTION

M. A. TELANG

Director

AND

B. W. CHAVAN

Deputy Director

*Bureau of Economics and Statistics
Government of Maharashtra, Bombay*

Even though Maharashtra is a highly urbanised State in the Indian Union its economy is predominantly rural with 72 per cent of its population residing in rural areas. In our rural economy, animal husbandry mostly provides subsidiary means of livelihood to the agriculturist and livestock raising has become an integral part of agriculture. Agriculturists maintain cattle, for they provide not only milk and other milk products but also basic power required on farms. Apart from the value of animal labour, the net contribution of animal husbandry by way of various livestock products itself is to the tune of 4 per cent of the State income of Maharashtra. Though this contribution may not appear significant when compared to income from agriculture proper, it must be remembered that animal husbandry industry is still in a more or less primitive stage with a high potential for further development.

The total livestock population of Maharashtra is of the order of 260 lakhs according to the 1961 Livestock Census. Bovine population constitutes the most significant category accounting for 184 lakhs or 71 per cent of livestock population. The bovine population is associated with multifarious activities on farms such as ploughing, transporting manures and produce, driving sugarcane crushers and oil ghanis and for lifting water for irrigation purposes. Besides, bovine population contributes directly towards income by making available milk and milk products, hides, horns, hoofs, bones and other products. In fact the value of livestock produce obtained from bovine population constitutes 74 per cent of the gross value of the entire livestock products in the State. It will thus be evident that in animal husbandry sector, bovine population plays a significant role.

The importance and need of statistics on various facets of an industry which has a high potential of development and which affects in one way or another, life of the majority of population need not be over-emphasised. In India, where there is still ample room for expansion of statistical systems, it is heartening to note that a livestock census is taken every five years. During the livestock census, livestock of various categories such as cattle, buffaloes, sheep, goats, horses and ponies, mules and donkeys, camels, pigs and poultry as well as agricultural implements and machinery were enumerated. For the bovine population, a still further break-up was available in the livestock census as shown in Table I.

TABLE I

Category	Population in Maharashtra (in '000)	
	Cattle	Buffaloes
I Males over three years		
(A) used for breeding only	23	14
(B) used for breeding and work both	2,71	28
(C) used for work only		
(a) castrated	53,68	2,19
(b) uncastrated	7,32	86
(D) Bulls and bullocks over three years not in use for breeding or work	97	7
II Females over three years		
(A) breeding cows		
(a) dry	23,52	5,73
(b) in milk on 15th April 1961	16,31	8,27
(c) not calved	6,01	1,96
(B) used for work only	36	30
(C) not in use for work or breeding purposes	23	13
III Young stock		
(A) Males		
(a) under one year	9,67	2,25
(b) one to three years	10,93	1,45
(B) Females		
(a) under one year	9,56	3,56
(b) one to three years	11,78	3,70

The quinquennial livestock censuses have made available information on number of heads of livestock periodically but there has not been any systematic attempt so far to obtain statistical information on the output of livestock products for different periods. So far, only sporadic attempts have been made by the Directorate of Marketing and Inspection (DMI) and the Indian Council of Agricultural Research (ICAR) by conducting sample surveys in this direction. The DMI published the data on milk rates per breeding animal in the *Agricultural Situation in India* (March, 1959). These yield rates are based on the survey conducted perhaps more than five years ago. Moreover, the results are presented according to the old set-up of States and hence separate information for Maharashtra is not available. Further, it is not known whether the State-wise results obtained from a sample survey on all-India basis are precise and based on a sufficiently large sample at the State level. The ICAR results have not yet been published.

Since separate estimates of milk production were not forthcoming for Maharashtra, the Bureau of Economics and Statistics, Maharashtra State, suggested to the Directorate of Economics and Statistics, Government of India that information on various yield rates in animal husbandry sector may be collected at the time of rationalised supervision. The Directorate of Economics and Statistics did not agree to this suggestion for implementation at the all-India level. It however suggested that, if the Maharashtra Bureau so desires, it may collect

such information for the State. Since the Bureau thought it absolutely necessary to have such important statistical information, a special schedule was introduced at the time of rationalised supervision undertaken just after 1961 livestock census.

For the purpose of rationalised supervision, 5 per cent of the villages were selected from every taluka or tahsil by simple random sampling. From each selected village, a second stage sample of 10 per cent households was selected by systematic sampling. The special schedule introduced by the Bureau was canvassed by the Supervisors and the services of Statistical Assistants were utilised for the purpose. In urban areas, two towns were selected in every district. The schedule was designed to obtain the information on number of animals slaughtered, production of wool and goat hair, production of eggs, dung and housing conditions. In this paper, the results pertaining to milk production are presented in some detail. The number of towns and villages selected for the purpose of enquiry is shown in Statement No. 2.

The advantage of conducting a sample enquiry at the time of rationalised supervision was two-fold. No additional cost of the enquiry except for printing the schedules and tabulating the results was incurred. Again, the sample size was so large that it has been possible to build up district-wise estimates of milk production. No enquiry into milk production conducted so far has yielded district-wise estimates. District-wise estimates in various sectors of the economy are assuming greater importance because of emphasis on regional planning. In this paper, therefore, district-wise estimates have been presented.

The information was collected by oral enquiry, and there lay its inherent weakness. It is admitted that the enquiry into yield rates must be conducted by an accounting method, by posting the investigator at the field of enquiry to take note of day-to-day changes in yields so as to avoid any subjective bias from entering the final estimates. It was, however, not possible for the Bureau to conduct such an enquiry on an accounting basis due to limited finances available with the Bureau. And an enquiry conducted to yield district-wise estimates will entail enormous cost. Since the Statistical Assistants associated with the present enquiry conducted by the Bureau were trained in field investigation, the non-sampling errors are not expected to assume a high proportion.

For estimating milk production, information pertaining to average milk yield rate per day during lactation period, average lactation period and average period between two calvings is used employing the following notation :

M=average milk yield per day per animal during lactation period.

L =average lactation period (in days).

P =average period between two calvings (in days).

The lactational yield is first estimated as $M \times L$ and it is assumed that the lactational yield is in fact the total milk yield between the two calvings so that the average yield per breeding animal per annum is given as

$$\frac{M \times L}{P} \times 365.$$

This is taken as the annual yield per breeding animal. No attempt was made to estimate yield rate per animal in milk because the livestock census information pertains to a specific day in a year and the number of animals in milk fluctuates widely from month to month. In fact, the Central Statistical Organisation observed "... any statistical change in the proportion of milk bearing animals to the total female breeding animals is likely to result in an undue increase in the average milk yield rates as well as in total milk production. . . . On further examination, it was found that the reference period for various censuses has not been uniform which might explain major part of the observed differences in 1951 proportions of animals in milk to total number of animals kept for breeding or milk productions".¹ After ascertaining the per animal yield rate, the total annual production is obtained by multiplying the average yield rate to the number of breeding female animals. The district-wise estimates of yield rates so obtained are presented in Statement No. 1. Table II gives the estimates for the State as a whole excluding Greater Bombay in respect of cows and buffaloes.

TABLE II—ESTIMATES OF LACTATION PERIOD, AVERAGE PERIOD BETWEEN TWO CALVINGS AND MILK PRODUCTION IN MAHARASHTRA (EXCLUDING GREATER BOMBAY)

Estimate of	Cow	She- buffaloes
1. Average milk yield rate per day per animal during lactation period (in lbs.)	2.37	4.75
2. Average lactation period (in days)	252	289
3. Average period between two calvings (in days)	596	602
4. Average yield rate per animal per annum (in lbs.)	366	832
5. Total milk production (in tons)	7,48,264	5,65,477

So far as milk production from cows and buffaloes is concerned the estimates based on the sample enquiry have been prepared for the State excluding Greater Bombay. In Greater Bombay, Government has established a milk colony at Aarey where a number of dairy animals are housed in 30 dairy farm units owned by the State. The animals in this colony are kept and maintained in a most efficient manner so much so that the yield rates in the colony are the highest in the State. Information on actual production in the Aarey Colony is available and the same has been utilised for estimating milk production in the Greater Bombay. Besides the animals in the colony, cattle and buffaloes are also maintained by private stable owners in other parts of Greater Bombay city. The yield rates of these animals are also likely to be high because of proper feeding of these animals. Hence, the yield rates of animals in Aarey colony are applied for other animals in Greater Bombay. Goat milk has also been estimated by making use of data collected during the sample enquiry. In addition to the milk produced in Maharashtra, it is also imported from Kaira district in Gujarat State. Table III shows the total milk production and availability of milk in Maharashtra.

1. National Income Statistics, Proposals for a Revised Series of National Income Estimates for 1955-56 to 1959-60, Central Statistical Organisation, p. 51.

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TABLE III—PRODUCTION OF MILK IN MAHARASHTRA

Item	Quantity (in '000 tons)
1. Production	
(A) Cow milk in Maharashtra excluding Greater Bombay ..	7,48.3
(B) Buffalo milk in Maharashtra excluding Greater Bombay ..	5,65.5
(C) Buffalo milk in Aarey Colony	35.6
(D) Buffalo milk in Greater Bombay outside Aarey Colony ..	89.7
(E) Cow milk in Greater Bombay	6.1
(F) Goat milk in Maharashtra	90.0
(G) Total milk production in Maharashtra State	15,35.2
2. Availability	
(H) Milk imported from Kaira District	11.9
(I) Total milk available in Maharashtra (G)+(H)	15,47.1

It will thus be seen that the total milk production in Maharashtra during the year 1960-61 was of the order of 15,35,000 tons, while the availability of milk was to the tune of 15,47,000 tons or 3.84 ounces per day per capita. The total availability of milk in the Indian Union is about 4.5 ounces per capita per day.

The actual availability of milk in Maharashtra is, however, still higher than what the figures in Table III show because a part of whole milk is converted into toned milk and double toned milk. Hundred litres of toned milk is prepared out of 40 litres of whole milk and 100 litres of double toned milk is obtained out of 20 litres of whole milk. Taking into consideration the actual conversion which was one in the Dairy managed by the Government, the total availability of milk in the State during the year 1960-61 was as shown in Table IV.

TABLE IV—AVAILABILITY OF MILK IN MAHARASHTRA (1960-61)

Item	Quantity ('000 tons)
1. Availability of whole milk	15,47.1
2. Less milk converted into toned milk	—10.9
3. Production of toned milk	27.4
4. Less milk converted into double toned milk	—0.5
5. Production of double toned milk	2.7
6. Total availability of milk (1)—(2)+(3)—(4)+(5)	15,65.8

Thus the total availability of milk in the State is estimated at 15,66,000 tons during 1960-61 or 3.89 ounces per capita per day.

As stated earlier, the estimates of yield rates and milk production have also been prepared by DMI. The estimates were primarily made for the old set-up of States and separate estimates for Maharashtra are not available. At the instance of Central Statistical Organisation, however, DMI has prepared the estimates for Maharashtra by making broad adjustments. It would be worthwhile to compare these estimates prepared by different agencies (Table V).

TABLE V—ESTIMATES OF MILK PRODUCTION PREPARED BY VARIOUS AGENCIES

Item	Bureau of Economics & Statistics, Maharashtra	Directorate of Marketing and Inspection*
Annual milk production in Maharashtra ('000 tons)		
(1) Cow	7,54.4	3,54.6
(2) Buffalo	6,90.8	5,34.6
(3) Total (1+2)	14,45.2	8,89.2

* Source :—Central Statistical Organisation.

It will be clear that the estimates prepared by the Bureau do not agree with the estimates prepared by DMI. It is not clear how exactly the DMI has made adjustments for arriving at Maharashtra estimates. If the DMI has applied old Bombay State yield rates for districts in Western Maharashtra and Madhya Pradesh, yield rates for districts in Vidarbha area and so on, the resulting estimates are likely to be erroneous. Statement No. 1 shows the regional variations in yield rates. It will be seen that the average yield per cow varies from 1.19 lbs. per day in Thana district to 4.22 lbs. in Nasik district. Nevertheless nothing definite can be said about the likely reasons of variations in the estimates, prepared by the two agencies.

The contribution of bovine population to the economy is in terms of milk and other products like hides, horns, hoofs, bones and dungs and animal power used on farms and for transport and irrigation purposes. Bovine population also generally goes on increasing thereby adding to the wealth.

The total value of milk is estimated at Rs. 109 crores in 1960-61. The value of other products obtained from bovine population is of the order of Rs. 35 crores. Thus, the bovine population generated material production worth Rs. 144 crores, during 1960-61 as shown in Table VI.

TABLE VI—GROSS VALUE OF LIVESTOCK PRODUCTS OBTAINED FROM BOVINE POPULATION IN MAHARASHTRA

Products	Gross value (in lakh Rs.)
(1) Milk	1,0,903*
(2) Hides	3,93
(3) Dungs	20,07
(4) Bones	18
(5) Meat and other products	3,62
(6) Increment in stock	6,74
Total	1,43,57

* Does not include value added due to conversion of milk into milk products.

The value of livestock products except milk as shown in Table VI is estimated by adopting mostly the same methods as used by the Central Statistical Organisation in "National Income Statistics."

The capital value of bovine population at current prices is of the order of Rs. 338 crores. If we confine ourselves only to female bovine population, its value at current prices is estimated at Rs. 143 crores. Corresponding to this capital, the gross value of output from female bovine population is estimated at Rs. 126 crores. Thus a direct investment of Rs. 100 in female bovine population yields products worth Rs. 88. In addition, the cattle owner has also to incur capital expenditure on housing cows and buffaloes. The value of breeding cows and she-buffaloes is estimated at Rs. 123 crores, showing thereby that the investment of the order of Rs. 20 crores which is the value of young stock and others not used for breeding purposes is not available for current production. Even among the breeding cows and she-buffaloes, there are a number of inefficient animals whose yield rates are quite low as will seen from Table VII.

TABLE VII—PERCENTAGE DISTRIBUTION OF BREEDING FEMALE POPULATION ACCORDING TO MILK YIELD RATES

Breeding Cows				Breeding She-buffaloes			
Yield rate per day (in seers)		Percentage to the total		Yield rate per day (in seers)		Percentage to the total	
(1)		(2)		(3)		(4)	
(1)	0.25 or below	..	10.6	(1)	0.50 or below	..	6.4
(2)	0.26—0.50	..	25.3	(2)	0.51—0.75	..	3.8
(3)	0.51—0.75	..	13.5	(3)	0.76—1.00	..	10.6
(4)	0.76—1.00	..	19.2	(4)	1.01—1.50	..	15.0
(5)	1.01—1.50	..	13.4	(5)	1.51—2.00	..	20.5
(6)	1.51—2.00	..	10.2	(6)	2.01—2.50	..	11.3
(7)	2.01—3.00	..	5.2	(7)	2.51—3.00	..	13.6
(8)	3.01 and over	..	2.6	(8)	3.01—4.00	..	9.8
				(9)	4.01—5.00	..	4.8
				(10)	5.01 and above	..	4.2
Total	..	..	100.0	Total	..	..	100.0

Item (5)	Seers (6)	Item (7)	Seers (8)
Average yield rate of all breeding cows	1.15	Average yield rate of all breeding she-buffaloes	2.31
I Quartile yield rate	0.39	I Quartile yield rate	1.27
II Quartile yield rate	0.76	II Quartile yield rate	1.86
III Quartile yield rate	1.32	III Quartile yield rate	2.77

It will be clear that 25 per cent of the breeding cows and she-buffaloes produce milk less than 0.39 seers and 1.27 seers per head per day respectively.

To sum up, the total value of female bovine population in Maharashtra is of the order of Rs. 143 crores which produce output worth Rs. 126 crores. Of the total female bovine population of 91.4 lakhs, breeding animals number 61.8 lakhs. If the cows yielding less than one seer and she-buffaloes yielding less than two seers of milk per day are considered inefficient² and are excluded, it is observed that only 21.8 lakhs, *i.e.*, 24 per cent of the female bovine population contributes materially to the economy of the State. If we include efficient young stock among efficient breeding cows and buffaloes which, when matured, would contribute materially towards the economy, it is seen that of the total female bovine population, 73 per cent consisting of inefficient and more or less useless stock is maintained in a year which is only a burden to the economy. A similar picture is likely to be obtained in the case of male bovine population.

STATEMENT No. 1
ESTIMATES OF AVERAGE PERIOD BETWEEN CALVINGS, LACTATION PERIOD AND
AVERAGE YIELD PER DAY

Districts	Cows			Buffaloes		
	Average between calvings (months)	Lactation period (months)	Average milk yield per day (in seers)	Average period between calvings (months)	Lactation period (months)	Average milk yield per day (in seers)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Thana	22.5	6.0	0.58	23.5	9.7	1.40
Kolaba	18.9	9.9	0.69	21.0	11.4	1.79
Ratnagiri	17.8	8.2	1.50	16.8	8.1	2.26
Nasik	22.2	7.6	2.07	24.3	10.3	3.07
Dhulia	19.8	8.3	1.50	21.4	9.6	4.68
Jalgaon	17.3	7.7	1.16	18.5	10.3	2.69
Bombay Division	19.9	7.9	1.34	20.6	9.9	2.64
Ahmednagar	20.1	8.1	1.37	23.6	9.2	3.21
Poona	19.0	8.8	0.89	17.0	9.1	2.22
Satara	18.4	9.0	1.25	20.8	9.1	2.08
Sangli	18.0	11.0	1.52	15.6	10.9	1.78
Sholapur	15.8	6.8	1.19	25.7	7.4	1.67
Kolhapur	23.3	9.8	1.18	22.0	8.8	2.30
Poona Division	19.0	8.6	1.21	19.1	9.1	2.15
Aurangabad	17.8	7.1	0.99	20.0	9.4	2.31
Parbhani	28.0	7.9	0.97	28.2	9.8	2.36
Bhir	17.8	10.3	0.81	20.2	11.1	1.98
Nanded	18.7	8.1	1.44	18.4	7.5	2.56
Osmanabad	18.0	9.4	1.25	21.5	11.4	2.15
Aurangabad Division	20.1	8.5	1.11	21.6	9.8	2.28
Buldhana	18.2	7.5	0.67	18.9	10.6	1.74
Akola	17.3	9.0	1.07	16.7	9.7	1.81
Amraoti	16.4	7.8	1.43	18.8	10.6	2.88
Yeotmal	18.8	7.7	1.03	20.4	10.5	2.64
Wardha	25.6	4.9	0.39	15.4	6.8	1.70
Nagpur	18.2	8.1	0.92	15.8	9.2	3.21
Bhandara	20.6	7.1	1.11	18.0	8.3	2.95
Chanda	22.1	11.1	0.91	19.8	10.2	1.38
Nagpur Division	19.5	8.2	0.96	18.2	9.7	2.27
Maharashtra State	19.6	8.3	1.15	19.8	9.5	2.31

2. These are the animals whose maintenance cost (including imputed cost of feed) is likely to exceed the value of milk produced.

STATEMENT No. 2

NUMBER OF TOWNS AND VILLAGES SELECTED FOR RATIONALISED SUPERVISION
IN LIVESTOCK CENSUS: 1961

Serial No.	District					No. of Towns selected	No. of Villages selected	Total
1	2					3	4	5
1.	Thana	..	..	..	..	2	82	84
2.	Kolaba	..	..	..	..	2	98	100
3.	Ratnagiri	..	..	..	..	2	78	80
4.	Nasik	..	..	..	..	2	83	85
5.	Dhulia	..	..	..	..	2	69	71
6.	Jalgaon	..	..	..	..	2	67	69
7.	Ahmednagar	..	..	..	..	2	67	69
8.	Poona	..	..	..	..	2	76	78
9.	Satara	..	..	..	..	2	61	63
10.	Sangli	..	..	..	..	2	27	29
11.	Sholapur	..	..	..	..	2	48	50
12.	Kolhapur	..	..	..	..	2	55	57
13.	Aurangabad	..	..	..	..	2	98	100
14.	Parbhani	..	..	..	..	2	80	82
15.	Bhir	..	..	..	..	2	53	55
16.	Nanded	..	..	..	..	2	68	70
17.	Osmanabad	..	..	..	..	2	73	75
18.	Buldhana	..	..	..	..	2	69	71
19.	Akola	..	..	..	..	2	83	85
20.	Amraoti	..	..	..	..	2	98	100
21.	Yeotmal	..	..	..	..	2	96	98
22.	Wardha	..	..	..	..	2	72	74
23.	Nagpur	..	..	..	..	2	76	78
24.	Bhandara	..	..	..	..	2	82	84
25.	Chanda	..	..	..	..	2	163	165
	Total	..	..	..	..	50	1,922	1,972