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## Research Note

# SPATIAL AND TEMPORAL VARIATIONS IN SIZE AND COMPOSITION OF BOVINE STOCK IN INDIA

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## Introduction

In the predominantly crop growing culture of India, the cultivation needs seem to have been primarily responsible for shaping the evolutionary pattern of bovines. It is adequately reflected in the relative size and composition of cattle and buffaloes. But there seem to be wide variations in the size and composition of bovine stock across States in India which needs to be taken into account in formulating a comprehensive bovine breeding policy with due regard to the agricultural requirements and resource availability of different States. Variations in the number and composition of bovines must have taken place over time which too needs to be examined to ascertain the changing pattern in relative importance of different categories of bovines. Vaidyanathan (1978) studied these aspects of the Indian bovine economy, but his study pertains to early seventies. Moreover, it does not include any data on crossbred cattle as it was not available then. The present study examines the variations in bovine stock across space and over time afresh with the latest available data.

## Bovine Population—All India

According to the Livestock Census of 1982, the latest year for which data are available, the total number of bovines in India was 262 million, of which the cattle numbered about 192 million and the buffaloes around 69 million. Thus 73.5 per cent of the bovine population consisted of cattle and 26.5 percent of buffaloes. Among the total cattle population, about 5 per cent were crossbred animals, the remaining being indigenous

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cattle. As for the age-sex distribution of bovines, the adult females, forming more than 36 per cent, significantly outnumbered the adult males, while the young stock constituted about one-third of the total (Table 1).

**Table 1. Size and composition of bovine population, All-India—1982**

Particulars	Adult male	Adult female	Young stock	Total
<i>Crossbred cattle</i>				
Number	2.8*	3.0*	3.0*	8.8*
Per cent	31.8	34.1	34.1	100.0
<i>Indigeneous cattle</i>				
Number	70.1*	56.2*	53.9*	180.2*
Per cent	38.9	31.2	29.9	100.S
<i>Total cattle</i>				
Number	74.3	60.1	57.9	192.3
Per cent	38.6	31.3	30.1	100.0
<i>Buffaloes</i>				
Number	8.2	34.7	26.4	69.3
Per cent	11.8	50.1	38.1	100.0
<i>Total Bovines</i>				
Number	82.5	94.8	84.3	261.6
Per cent	31.6	36.2	32.2	100.0

Source : Livestock Census, 1982.

\* Does not include figures for Punjab for which break-up is not available.

Note : Figures for Punjab included here relate to 1977.

The differences in the age-sex composition of cattle and buffaloes, taken separately, are even more significant. While the number of males is about 25 per cent more than the number of females among adults, there is a preponderance of females among adult buffaloes, the adult males being less than one-fourth of the adult females. Among the crossbred cattle also, the adult females outnumber the adult males. The proportion of young stock is higher among buffaloes in comparison to that among indigenous crossbred cattle. Further, while the share of indigenous cattle among adult male bovines is as high as 85 per cent, they account for

only 60 per cent of all adult female bovines. It indicates the importance of indigenous cattle more as a source of draught power than as a source of milk production.

### Variations Across States

There were striking variations in the density of bovine population per unit of cultivated area across States as shown by Table 2.

It varied from 110 per hundred hectares in Maharashtra to 299 in West Bengal<sup>1</sup>. It may be seen that the States with high bovine density were generally those which had a high human population (rural) density, which shows that there is a positive association between the two.

Further, since indigenous cattle constituted the major segment of total bovine population in most States, the high density of total bovine population was observed in the same States as had a high density of indigenous cattle and *vice versa*. Thus, States lying in the north-eastern parts of India, viz., Uttar Pradesh, Bihar, Assam, West Bengal and Orissa as also Tamil Nadu in the south were endowed with high density, and States in the north-western plains like Punjab, Haryana, Rajasthan, Gujarat, Maharashtra along with Karnataka and Kerala in the South had low density of indigenous cattle as well as of total bovines. It may, however, be noted that in Kerala and Rajasthan, the adult females of indigenous cattle significantly outnumbered the adult males as revealed by the ratio of adult females to adult males in respect of indigenous cattle whereas in all other States the reverse was true. It indicates that in Kerala and Rajasthan the indigenous cattle are reared more for milk production than for draught purposes, particularly in Kerala where the draught animal requirements for crop cultivation are very little.

As regards buffalo, its density was high in Punjab, Haryana, Uttar Pradesh and Andhra Pradesh, the States which had high food-grains production per capita in the country, and low in Assam, West Bengal and Orissa, the States which had high density of indigenous cattle, as also in Kerala and Maharashtra (Table 2). Further, Punjab and Haryana were the only States where the buffalo density was considerably higher than the indigenous cattle density. However, there, was marked plurality of adult females over adult males among buffaloes in most States which indicates

1. The States of Himachal Pradesh and Jammu & Kashmir have been excluded from comparison, as the high level of bovine density in these States was due to these being hilly areas,

Table 2. Bovine and human (rural population) density across States—1982

State	Density per ha of net sown area				Ratio of adult females to adult males			
	Crossbred cattle	Indigenous cattle	Buffaloes	Total bovines	Rural population	Crossbred cattle	Indigenous cattle	Buffaloes
Andhra Pradesh	0.016	1.15	0.77	1.94	3.63	1.75	0.83	3.95
Assam	0.052	2.44	0.21	2.70	6.59	6.00	0.94	1.00
Bihar	0.019	2.04	0.59	2.65	7.79	1.00	0.57	2.80
Gujarat	0.006	0.72	0.46	1.18	2.43	1.00	0.63	51.20
Haryana	0.071	0.57	0.92	1.56	2.76	1.10	0.86	12.54
Karnataka	0.052	1.04	0.35	1.44	2.54	3.71	0.93	7.25
Kerala	0.673	0.76	0.19	1.62	9.54	36.50	3.16	0.78
Madhya Pradesh	0.003	1.44	0.34	1.78	2.21	2.00	0.84	1.67
Maharashtra	0.026	0.86	0.22	1.10	2.23	3.00	0.76	6.60
Maharashtra	0.026	0.86	0.22	1.10	2.23	3.00	0.76	6.60
Orissa	0.038	2.07	0.22	2.33	3.80	5.00	0.86	0.71
Orissa	0.038	2.07	0.22	2.33	3.80	5.00	0.86	0.71
Orissa	0.038	2.07	0.22	2.33	3.80	5.00	0.86	0.71
Punjab	N.A.	0.79	0.98	1.76	2.87	N.A.	0.70	8.68
Punjab	N.A.	0.79	0.98	1.76	2.87	N.A.	0.70	8.68
Punjab	N.A.	0.79	0.98	1.76	2.87	N.A.	0.70	8.68
Rajasthan	0.003	0.86	0.36	1.26	1.74	2.00	1.40	26.00
Rajasthan	0.003	0.86	0.36	1.26	1.74	2.00	1.40	26.00
Rajasthan	0.003	0.86	0.36	1.26	1.74	2.00	1.40	26.00
Tamil Nadu	0.155	1.65	0.55	2.37	5.66	1.64	0.84	5.73
Tamil Nadu	0.155	1.65	0.55	2.37	5.66	1.64	0.84	5.73
Tamil Nadu	0.155	1.65	0.55	2.37	5.66	1.64	0.84	5.73
Uttar Pradesh	0.189	1.32	0.91	2.43	5.26	0.29	0.55	3.94
Uttar Pradesh	0.189	1.32	0.91	2.43	5.26	0.29	0.55	3.94
Uttar Pradesh	0.189	1.32	0.91	2.43	5.26	0.29	0.55	3.94
West Bengal	0.099	2.72	0.18	2.99	7.21	4.00	0.92	0.39
West Bengal	0.099	2.72	0.18	2.99	7.21	4.00	0.92	0.39
West Bengal	0.099	2.72	0.18	2.99	7.21	4.00	0.92	0.39
All-India	0.062	1.29	0.49	1.84	3.70	1.07	0.80	4.23

Source : 1. Livestock Census, 1982.

2. For net sown area : Directorate of Economics and Statistics, Ministry of Agriculture, New Delhi.

3. For rural population : Census, 1981.

Note : Data on Punjab relates to 1977. N.A. = Not available.

that buffalo was reared mainly as a milch animal in most States. The only exceptions were the States of West Bengal, Assam, Orissa and Kerala where buffalo rearing was not popular, and it was maintained more for draught purposes than as a milch animal. It was because in these States, which are characterised by high rainfall and have paddy as the major crop, the male buffaloes are better suited for paddy cultivation.

As for the density of crossbred cattle, it was significantly high only in Kerala remotely followed by Uttar Pradesh, Tamil Nadu, West Bengal and Haryana, and quite low in other States. In Kerala there was overwhelming predominance of adult female over adult males, and in most other States the adult females had an edge over adult males, while in Uttar Pradesh the adult males were more than three times the adult females among crossbred cattle. It shows that while in most States crossbred cattle were kept primarily for milk production, in Uttar Pradesh these were reared mainly for draught purposes owing to large draught requirements of the State. The relatively large stock of crossbred adult males of cattle in Uttar Pradesh may have partly resulted from the import of crossbred male calves of cattle at low prices from the neighbouring State of Haryana and Union Territory of Delhi where these calves were not considered quite suitable for draught purposes.

### Variations over Time

The total bovine population increased at the rate of 0.79 per cent per annum over the period 1961-82 as exhibited by Table 3. It was the rise in buffalo population which was mainly responsible for the increase in bovine population during this period. The buffalo population has consistently grown faster than the cattle population so that the increase in buffalo herd was more than thrice that in cattle<sup>2</sup> over the period. It may however, be observed that among both buffaloes and cattle, the rise was mostly caused by the increase in youngstock (particularly the female youngstock) and adult females, although it was much more pronounced in the case of buffaloes. The increase in adult male stock of both was much less. It may be seen from Table 3 that the population of adult males of cattle as well as of buffalo did not increase much during the period 1961-77, and in fact it declined during 1977-82 which points to the increasing substitution of draught animals by mechanical power over time.

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2. Includes crossbred cattle. As the data on crossbred cattle were available only for 1982, variations over time could not be studied for them separately.

Table 3. Trends in bovine population in India (1961-82).

(Population in millions)

	Years					Annual percentage change		
	1961	1966	1972	1977	1982	1961-77	1977-82	1961-82
<i>Cattle*</i>								
Adult males	72.5	73.3	74.5	74.9	74.3	0.21	-0.16	0.12
Adult females	54.2	54.7	56.4	57.6	60.1	0.39	0.86	0.52
Youngstock	46.6	48.0	46.8	47.6	57.9	0.13	4.32	1.15
(a) Male youngstock	22.7	23.3	22.6	22.6	25.8	-0.03	2.84	0.65
(b) Female youngstock	23.9	24.7	24.2	25.0	32.1	0.29	5.68	1.63
Total cattle	173.3	176.0	177.7	180.1	192.3	0.25	1.36	0.52
<i>Buffaloes</i>								
Adult males	7.7	8.2	8.1	8.4	8.2	0.57	-0.48	0.31
Adult females	25.0	26.1	29.2	31.9	34.7	1.73	1.76	1.85
Youngstock	18.3	18.6	19.9	21.7	26.4	1.16	4.34	2.11
(a) Male youngstock	6.5	6.4	7.0	7.6	7.9	1.06	0.78	1.02
(b) Female youngstock	11.8	12.2	12.9	14.1	18.5	1.22	6.24	2.70
Total buffaloes	51.0	52.9	57.2	62.0	69.3	1.35	2.36	1.71
Total bovines	224.3	228.9	234.9	242.1	261.6	0.50	1.62	0.79

Source: Livestock Census Reports.

\* Includes crossbred cattle.

The increase in adult females and youngstock of both cattle and buffaloes during 1977 was faster (except in the case of male youngstock of buffalo) than that during 1961-77 as the Operation Flood Programme of the Government for enhancing milk production was in full bloom during 1977-82. In the case of cattle it was due to a sizeable increase in the female crossbred cattle population during this period while the greater availability of fodder and feed impetus to increased rearing of female adult and youngstock of buffaloes. In fact, the growth rate of adult buffaloes had started accelerating after 1966 in the wake of Green Revolution. The remarkable increase in the female youngstock of both buffalo and cattle during 1977-82 points to the expectation of significant increase in the adult female stock of both in the subsequent period.

As for the variations in the composition of bovine stock, it may be seen from Table 4 that while there was a rise in the relative share of breedable buffaloes and total females youngstock in the total bovine population, there was a decline in the proportion of working animals and breedable indigenous cows over the period 1961-82. However, the fall in the proportion of breedable indigenous cows was nearly made up by the addition of breedable crossbred cows in a small way in most States and in a big way in Kerala, where the fall was substantial, during this period. The decline in the share of working animals over time was quite significant in most States including Haryana, Punjab and Rajasthan where it was already low, but it was more striking in the case of Kerala, Tamil Nadu and Andhra Pradesh. It was partly due to a considerable rise in the proportion of female youngstock in almost all these States and partly owing to the increase in the share of breedable buffaloes except in Kerala, West Bengal, Orissa and Assam. Although the total buffalo density was higher than the total indigenous cattle density only in Punjab and Haryana, as noted above, the proportion of breedable buffaloes was greater than that of breedable cows indigenous cows not only in these two States but also in Uttar Pradesh, Andhra Pradesh and Gujarat in 1982 whereas in 1961 the proportion of breedable buffaloes was lower than that of breedable indigenous cows in the latter three States.

### Conclusions

From the foregoing analysis it is evident that the bovine structure in India is fast changing in favour of enhancing milk production, particularly after 1977, as manifested by the sharp increase in the population of female adults as well as youngstock, particularly of buffaloes. There is a progressive shift to buffalo and crossbred cow from indigenous



Table 4. Relative share of different categories of bovines in total bovine population (1961 and 1982).

State	Breedable indigenous cows		Breedable crossbred cows	Breedable buffaloes		Total female youngstock		Total male youngstock		Working animals	
	1961	1982	1982	1961	1982	1961	1982	1961	1982	1961	1982
Andhra Pradesh	18.8	17.6	0.3	15.6	19.4	15.3	20.9	12.6	10.5	34.5	24.7
Assam	26.1	27.4	0.8	2.4	2.5	15.3*	19.3	15.1*	18.5	37.4	31.5
Bihar	20.1	20.6	0.2	7.8	10.7	16.3	17.1	14.1	10.9	40.4	40.2
Gujarat	19.2	16.9	0.2	17.7	22.4	19.2	22.5	10.9	10.7	32.2	27.1
Haryana	14.6*	11.0	1.6	24.2*	28.5	23.9*	27.6	14.0*	15.1	22.5*	15.8
Himachal Pradesh	26.4*	23.1	1.8	11.7*	14.8	17.5*	18.0	13.8*	11.4	29.7*	31.0
Jammu & Kashmir	22.7	25.7	1.7	9.4	10.8	19.7	22.5	16.0	14.3	25.7	25.0
Karnataka	24.2	24.5	1.7	12.8	13.6	15.1	19.7	12.0	11.5	33.0	28.7
Kerala	35.5	22.2	20.7	4.0	4.0	20.1	27.8	13.7	12.1	25.8	7.9
Madhya Pradesh	23.5	24.8	0.1	7.5	8.3	11.9	18.6	15.6	14.9	33.6	33.1
Maharashtra	24.9	24.8	1.0	8.7	11.3	15.5	15.5	13.2	12.1	36.8	32.1
Orissa	25.6	29.2	0.7	2.3	2.8	12.2	15.7	12.1	13.7	44.7	37.7
Punjab	13.4*	12.5@	N.A.	24.3*	28.6@	22.1*	22.2@	14.7*	14.5@	25.3*	21.4@
Rajasthan	28.3	26.1	0.1	12.1	15.1	19.9	24.9	15.1	13.7	23.8	18.9
Tamil Nadu	20.4	23.0	2.7	8.4	12.7	11.0	18.4	10.9	12.0	43.8	31.0
Uttar Pradesh	17.9	14.4	1.4	15.4	18.9	15.4	16.8	12.6	12.7	38.1	35.4
West Bengal	30.3	28.1	1.4	2.1	1.3	13.7	20.9	12.1	13.9	40.1	34.1
All India	22.7	21.3	1.1	10.8	12.4	15.9	19.3	13.0	12.9	35.9	30.0

Source : Livestock Census Reports.

Note : Data on crossbred cattle were reported for the first time in 1982.

\* Relates to 1966. @ Relates to 1977. N.A. = Not available.

cow as a source of milk. On the hand, the fall in the adult male population of both cattle and buffaloes indicates the impact of mechanisation of agriculture on draught animal population in several States. But as there are considerable variations in the composition of bovine stock across States/Regions, the bovine breeding policy has to be different in different States/Regions. At one end of the spectrum are States like Punjab, Haryana, Gujarat, Uttar Pradesh and Andhra Pradesh where buffalo dominates the scene. In such States selective breeding of buffalo is called for. At the other end are the eastern States of Assam, West Bengal and Orissa where indigenous cow predominates. In these States there is considerable scope for progressive crossbreeding of cattle as in the case of Kerala. Tamil Nadu, Karnataka, Maharashtra, Rajasthan and Bihar present a mixed picture where although the indigenous cows constitute the major segment of bovine population, the buffaloes are reared in significantly large numbers. Rearing of both buffaloes and crossbred cows should be encouraged in these States on a selective basis in different districts.

#### Reference

- Vaidyanathan, A. (1978) "Aspects of India's bovine economy: some preliminary results". *Indian Journal of Agricultural Economics*, 33 (1): 1-29.