



Dynamics of milch bovine population in Meghalaya

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In India's livestock a sub-sector of agricultural economy plays an important role in the economic development of rural areas. It provides raw materials in the form of wool, hairs, hides, skins etc. for manufacturing sector. It is a source of high protein food in the form of milk, milk products, meat and eggs. This sector has an enormous employment opportunities and potential because livestock rearing, product processing and marketing is highly labour intensive activity. Livestock is an important source of supplementary income for over 70 million households in rural India. Income from livestock accounts for about 15–40% of total farm income of the rural households (Kumar 2005). Livestock sector in India makes significant contribution to the country's economy. It contributes around 4.36% to the Gross Domestic product (GDP) and 24.72% to agricultural GDP (AgGDP) (GOI 2006). The livestock sector in India has recorded growth rate of around 5.2% per annum, which is almost twice that of agricultural sector (Singh 2002). Livestock production is likely to undergo significant changes in terms of population adjustment, production efficiency, commercialization and intensification to respond to the increasing demand for animal based food products (Birthal and Parthasarathy Rao 2004). The livestock sector acquires special importance in the hill states like Meghalaya on economic and ecological grounds due to poor productivity of the crop sector, low availability of per capita arable land and lack of other income generating sources. Milch bovines assume a greater significant role in the livelihoods of people of Meghalaya. The importance of the livestock sector in Meghalaya is also reflected by the fact that most of the households keep bovine.

The study was conducted to determine the dynamic change in the composition of milch bovine population in Meghalaya over the years and changes in the growth rates, lactating efficiency and stocking density of the milch bovine population in Meghalaya.

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The data on milch bovines was compiled for the years 1983–84 to 2003–04 from various issues of Basic Statistics of North Eastern Region and various Annual Reports of Directorate of Animal Husbandry, Government of Meghalaya. The ordinary least square method was used to fit exponential function in order to compute annual compound growth (Dandekar 1980).

$$Y_t = Y_0 (1 + r)^t \quad (1)$$

Y_t , Milch bovine population in the year t ; Y_0 , Milch bovine population in the base year; and r , Compound growth rate. Now taking natural log on both sides of the above equation we get

$$\ln Y_t = \ln Y_0 + t \ln (1 + r) \quad (2)$$

Putting $\ln Y_t = Y$, $\ln Y_0 = a$, $\ln (1 + r) = b$ in (2) we get

$$Y = a + bt \text{ and } 1 + r = \exp^b$$

$$\text{Therefore, } r = (\exp^b - 1) \times 100 \quad (3)$$

The information regarding total human population, total geographical area, total cropped area etc. were compiled from various issues of Basic Statistics of North Eastern Region for calculating various ratios.

Compositional change in milch bovine population in Meghalaya: There were sharp changes in the composition of milk and milch animals (Table 1) in Meghalaya during last two decades. Among crossbred cows both cows in milk and milch cows showed an increasing trend in the state over the various census periods. The population of the indigenous cows (in milk) showed an irregular trend w.e.f 1983–84 to 2003–2004. It was highest (100.1 thousand number) in 1987–88. The declining trend was observed from 1987–88 to 1997–98. But in 2003–2004 the population of in milk indigenous cows increased to 93.2 thousand numbers. If we see the overall trend in population of milch crossbreed cows and milch indigenous cows, we observed that both the populations of crossbred cows and indigenous cows increased rapidly over the time. This may be due to the high demand for the milk and milk products in the state. The increase in indigenous cows population may be due to the increase in demand of the meat, due to increase in the human population.

Table 1. Compositional change in bovine population ('000 Numbers)

Particularsyear	Animals in milk			Milch animals		
	Crossbred cows	Indigenous cows	Buffaloes	Crossbred cows	Indigenous cows	Buffaloes
1983–84	5.1	90.8	5.2	8.4	158.2	10.1
1987–88	6.0	100.1	5.4	8.8	175.8	10.9
1992–93	7.7	93.9	4.4	10.1	180.6	8.4
1997–98	10.1	86.1	5.6	13.4	185.6	11.8
2003–04	12.6	93.2	2.7	16.0	210.1	5.1

Source: Government of Meghalaya (2003). Report on Sample Survey for Estimation of Production of Milk, Egg and Meat for the year 2003.

Table 2. Ratio of cattle to buffaloes and their lactating efficiency

Particulars	Ratio of indigenous cows to buffaloes		Ratio of crossbred cows to buffaloes		Lactating efficiency		
	In milk	Milch	In milk	Milch	Indigenous cows	Crossbred cows	Buffaloes
Year							
1983–84	17.46	15.66	0.98	0.83	0.57	0.61	0.51
1987–88	18.54	16.13	1.11	0.81	0.57	0.68	0.49
1992–93	21.34	21.5	1.75	1.20	0.51	0.76	0.52
1997–98	15.37	15.73	1.80	1.14	0.46	0.75	0.47
2003–04	34.52	40.38	4.67	3.08	0.44	0.78	0.52

Since most of the people of Meghalaya are non-vegetarian so they keep indigenous cows not only for milk purpose but also for meat purpose.

Trend in buffalo population is irregular for both in milk and milch buffaloes. The population of buffaloes decreased sharply over the years. This is a serious concern for the policy makers and the researchers to find the causes of decline in the buffaloes population. Such decline in buffaloes population may be due to reproduction problems in buffaloes or may be due to poor feeding and management practices in the state.

The ratio of indigenous cows to buffaloes, ratio of crossbred cows to buffaloes and lactating efficiencies of indigenous cows, crossbred cows and buffaloes are given in (Table 2). Both indigenous cows in milk and milch outnumbered the buffaloes in all the census years. However there was some decline in the ratio in 1997–98. In milk, indigenous cows per buffalo varied between 15.37 in 1997–98 to 34.52 in 2003–2004. Milch indigenous cows per buffalo varied between 15.73 in 1997–98 and 40.38 in 2003–04. The buffaloes outnumbered crossbred cows in 1983–84. After that in milk crossbred cows outnumbered buffaloes in all the census years. Number of milk-crossbred cows per buffaloes varied between 0.98 in 1983–84 to 4.67 in 2003–2004. In 1983–84 and 1987–88 buffaloes outnumbered milch crossbred cows. After that milch crossbred cows outnumbered buffaloes. Number of milch crossbred cows varied between 0.81 in 1987–88 to 3.08 in 2003–04.

The lactating efficiencies of crossbred cows were relatively greater than the indigenous cows and buffaloes. The reasons for the greater lactating efficiencies of crossbred

cows may be better feeding and management practices provided to the crossbred cows. In 1983–84 to 1987–88, the lactating efficiencies of indigenous cows were better than buffaloes. There was decreasing trend (0.57 to 0.44) in lactating efficiencies of the indigenous cows during 1987–88 to 2003–04. Lactating efficiencies of crossbred cows showed increasing trend (0.6 to 0.78) over the years but in 1997–98, there was slight decline in lactating efficiency as compared to 1992–93. Lactating efficiencies of the buffaloes was almost stable over the years (0.51). These results confirm that (a) the indigenous cows are reared by the farmers to sustain meat supply and their milk is considered as by product only (b) crossbred cows are considered as the main milch animals to sustain milk production (c) importance of the buffaloes over the years is declining sharply.

Growth rates of milch bovines: The compound growth rates worked out for milch bovines under different categories between two census years are presented in Table 3. The growth rates for in milk indigenous cows were both positive and negative during various inter-census periods and was lowest (–3.38) during 1992–93 while for milch indigenous cows it was positive with highest growth rate (2.96%) during 1997–98 to 2003–04. Compound growth rates for in milk and milch crossbred cows were positive in all the inter census years and highest rates (7.68% and 8.32%) were observed during 1992–93 to 1997–98. It implies that crossbred cows and indigenous cows are reared by the farmers as main milch animals to sustain the milk production in Meghalaya. The compound growth rates of the buffaloes are both positive and negative. In 1987–88 to 1992–93 growth rate was

Table 3. Compound growth rates (%) of bovine in Meghalaya

Period	Indigenous cows		Crossbred cows		Buffaloes	
	In milk	Milch	In milk	Milch	In milk	Milch
1983–84 to 1987–88	2.26	2.50	4.19	0.82	1.45	2.0
1987–88 to 1992–93	–0.90	0.02	6.61	4.35	–1.07	–3.44
1992–93 to 1997–98	–3.38	1.66	7.68	8.32	8.0	10.35
1997–98 to 2003–04	1.20	2.96	4.19	4.19	–11.93	–14.38

negative for both in milk (–1.07%) and milch buffaloes (–3.44%). During 1997–98 to 2003–04 growth rates were highly negative (–11.93% and –14.38%). It indicates that the population of the buffaloes declined sharply over the years. This may be due to poor management practices, inbreeding problems and prevalence of foot mouth and other diseases.

Density scenario of milch bovine population: The stocking rates based on animal man ratio, animal land ratio and animal geographical area ratio of indigenous cows, crossbreeds cows and buffaloes show significant disparities over the years in Meghalaya (Table 4). Every thousand persons of the state had stocked 108.87 indigenous cows, 5.78 crossbreeds cows and 6.95 buffaloes in 1983–84. In 2003–04 every thousand persons of the state had stocked 86.48 indigenous cows, 6.59 crossbreed cows and 2.14 buffaloes. The stocking density of indigenous cows and buffaloes showed decreasing trend whereas increasing trend in case of crossbreed cows over the period was observed. This implies that farmers are replacing indigenous cows and buffaloes with crossbred cows over the years. Every hectare land under cropped and net

sown area of the state in 2003–04 had stocked 1.02 indigenous cows, 0.077 crossbreed cows and 0.025 buffaloes which were higher than previous years in case of indigenous and crossbred cows but was lowest in case of buffaloes. However, there were 9.36 indigenous cows, 0.71 crossbreed cows and 0.23 buffaloes per kilometer of geographical area. From the above observation we conclude that stocking density of milch animals was very low in the state and hence stocking density can be increased to boost the milk production and production of other livestock by products in the state.

Population of indigenous cows increased over the study period with annual growth rate of 1.14%. However the population of the in milk crossbred cows increased at the rate of 4.65% per annum. Population of in milk and milch buffaloes decreased at the rate of 2.77% and 2.93, respectively, per annum. Growth pattern of bovine in recent years indicated that if managed properly, bovine sector could be a driving force in the growth of agricultural sector in Meghalaya. Growth in productivity of indigenous cattle is also not encouraging. This calls for revising livestock research priorities across regions, species and commodities.

SUMMARY

We studied the changes in the composition of milch bovine population and their contributions in various livestock byproducts over the years w.e.f. 1983–84 to 2003–04. Our results revealed that over the years, there was an improvement in the milch bovine population. The share of the crossbred milch cows in total milk production is increasing rapidly over the years where as there is sharp decline in the share of indigenous cows and buffaloes over the years in milk production. There is a decline in the lactating efficiencies of the indigenous cows and buffaloes over the years. The stocking density based on the animal man ratio, animal land ratio and animal geographical are clearly indicated that stocking density of milch animals is very less in Meghalaya. So stocking density can be increase to get more profit from milch bovine population. Contribution of the different livestock by-products showed increasing trend over the years.

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Table 4. Density of bovine in Meghalaya

Particulars	Year	Indigenous cows	Crossbred cows	Buffaloes
Animal man ratio (per thousand persons)	1983–84	108.87	5.78	6.95
	1987–88	102.27	5.12	6.34
	1992–93	99.15	5.54	4.61
	1997–98	87.25	6.30	5.55
	2003–04	86.48	6.59	2.14
Animal land ratio (per ha of cropped area)	1983–84	0.780	0.041	0.050
	1987–88	0.821	0.041	0.051
	1992–93	0.921	0.051	0.043
	1997–98	0.861	0.062	0.055
	2003–04	1.02	0.077	0.025
Animal land ratio (per ha of net sown area)	1983–84	0.820	0.043	0.050
	1987–88	0.911	0.045	0.056
	1992–93	0.921	0.051	0.043
	1997–98	0.860	0.062	0.055
	2003–04	1.02	0.077	0.025
Animal geographical area ratio (per square kilometer)	1983–84	7.05	0.37	0.45
	1987–88	7.84	0.39	0.49
	1992–93	8.05	0.45	0.37
	1997–98	8.27	0.59	0.52
	2003–04	9.36	0.71	0.23

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