



Dynamics of livestock and poultry population in India and Himachal Pradesh: A comparative temporal analysis

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Received: 14 September 2021; Accepted: 20 October 2023

ABSTRACT

The present study on livestock population dynamics can provide useful insights about growth trends of various species and overall livestock population. Such type of analysis is useful for making sound policy and programme planning in livestock sector. The study is based on the secondary data (1977 to 2019) collected from sources such as different livestock census, basic animal husbandry statistics, statistical outlines of India and Himachal Pradesh. The results revealed that India's cattle population after attaining a peak of 204.5 million in 1992 remained in the range of 190-200 million during majority of census period. Cattle population in Himachal after attaining peak in 2007 has shown sharp decline in last two censuses. During last two census (2007-19) period, buffalo population's growth has slowed down in India whereas it showed negative growth rate in Himachal Pradesh. Goat population in India showed promising positive trend in majority of census period but in Himachal Pradesh, growth has slowed down. Sheep population also showed steady growth in majority of census period in India whereas in Himachal Pradesh it has declined in every census. Therefore, growth rate of cattle and buffalo population has either stagnated or slowed down in India. On the contrary, cattle, buffalo, sheep population declined in Himachal Pradesh and goat population witnessed slower growth rate in comparison to entire India. The poultry population in the India and Himachal Pradesh increased at impressive and consistent growth rate.

Keywords: Himachal Pradesh, India, Livestock census, Livestock population

Livestock production provides employment to 20.5 million people in India (GoI 2021) and contributes 4.2% to gross value in economy of India (GoI 2020). More than half of 14,83,280 households in Himachal Pradesh own dairy cattle (GoI 2019). Thus, livestock contributes immensely in economy and livelihood of India including Himachal Pradesh. Value of output from livestock sector was about ₹10,43,656 crore at current prices during 2017-18 which is about 33.25% of the value of output from agricultural and allied sector (DAHDF 2020).

The livestock sector in India is highly dynamic and is evolving in response to rapidly increasing demand of livestock products. The growth and production trend of livestock species have huge implications on food security and rural livelihood of India. India is home to diverse genetic resources in terms of 209 indigenous breeds of livestock which include 53 for cattle, 20 for buffalo, 37 for goat, 44 for sheep, 7 for horses and ponies, 9 for camels, 13 for pig, 3 for donkey, 1 for yak, 19 for chicken, 2 for duck and 1 for geese (ICAR-NBAGR 2023). Cattle (35.94%), goat (27.80%), buffaloes (20.45%), sheep (13.87%), pigs (1.69%), camel (0.05%) and equine (0.10%) are major

species of livestock reared in India (DAHDF 2019). The livestock population of Himachal Pradesh (20th Livestock Census 2019) is 44.11 lacs (0.82% of Indian livestock). It comprises of cattle (41.39%), goat (25.11%), sheep (17.93%), buffaloes (14.64%), equines including horses and ponies, mules and donkey (0.94%) and other species like yak, pigs, rabbits, etc. (0.20%). Although, studies (Prabhu *et al.* 2012, Kumari 2016, Sharma and Shilpa 2016, Sonavale *et al.* 2020) have been done to analyze the composition and trend in livestock population from time to time, the present study compared trends in growth of livestock population in India to that of Himachal Pradesh with the objectives to estimate the trends and changes in the composition of the livestock and poultry population of India *vis a vis* Himachal Pradesh and to assess the factors responsible for change in population of various livestock species from 1977-2019 in India and Himachal Pradesh.

MATERIALS AND METHODS

The study is based on the secondary data collected from sources such as different issues of livestock census, basic animal husbandry statistics of different years and various issues of statistical outlines of India and Himachal Pradesh. Himachal Pradesh is a western Himalayan state in northern part of India situated between 30°22'N and 33°12'N latitude and 75°47'E and 79°04'E longitude with

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geographical area of 55,673 square kilometers.

The per cent change in the population over the base year for t^{th} year was calculated as:

$$\text{Per cent change} = (X_t - X_{t-1} / X_{t-1}) \times 100$$

Where, X_t and X_{t-1} represents the population in t^{th} and $(t-1)^{\text{th}}$ year, respectively.

RESULTS AND DISCUSSION

Cattle population

India: Cattle population increased by 6.92% during 1977-82, 3.76% during 1982-87, 2.45% during 1987-92 and reached 204.5 million in 1992 (Table 2). Spread of green revolution technology turned out to be more favourable for growth of livestock production than crop farming, as sector witnessed technological and institutional reforms (Chand and Raju 2008). During this time, extensive cross-breeding, various development schemes and extension programme implemented by government led to increase in livestock population (Prabhu *et al.* 2012).

However, the population shifted to a decreasing trend for next two censuses with decreased growth of -2.79% during 1992-97, -6.89% during 1997-2003 and it stood at low of 185.1 million in 2003 (Table 1). It increased at rate of 7.50% and rose to 199.90 million in 2007 but again decreased by -4.10% (2007-12) to 190.90 million in 2012. In recent census (2012-19), it has a slight increase of 0.83% and stood at 192.52 million. Thus, it can be inferred that after attaining a peak in 1992, population has remained steady over last 22 years with overall decline of -5.85%.

The trend in livestock population can also be properly understood by studying the change in composition and productivity of livestock (Tisdell and Gali 1999). The change in livestock population in terms of male and female cattle helps us to explain the change in population in a better way. Sharp increase in female cattle population and decrease in male cattle population has been observed during last two census period. The percentage of female cattle increased by 6.52% in 2007-12 and by 26.9% in 2012-19. Whereas, male cattle population declined by -18.77% in 2007-12 and decreased by -30.2% in 2012-19 (DAHDF 2019).

Therefore, these two opposing forces of decrease in non-productive bovine (male cattle) and increase in more productive crossbred dairy cows have maintained

a balance in cattle population. This reflects preference of farmer to keep quality dairy cows and abandon male and unproductive cattle. Similar kind of finding has also been reported by Yasmeen *et al.* (2019) who observed that the population of non-productive bovine (indigenous cattle and male cattle) had declined, whereas that of productive animal like crossbred cow had increased. The male cattle population declined due to reduction in the bullock population (Sonavale *et al.* 2020). Also, in recent census, certain states of India such as West Bengal, Bihar and Jharkhand witnessed increase, while Maharashtra, Uttar Pradesh, Madhya Pradesh showed decline in population (DAHDF 2019). Thus, regional variations in increase and decrease of cattle population would also be factor in the stabilization of cattle population of India.

Himachal Pradesh: The cattle population increased by 3.32% during 1977-82, declined by -0.46% over 1982-92, increased by 2.99% during 1997-03 and by 1.47% during 2003-07 (Table 4). So, over a span of 30 years (1977-2007) there was slight increase in cattle population from 21.05 to 22.69 lakhs (Table 3). After 2007, the state witnessed decline of -5.29% in 2007-12, which became sharper as -15.03% in 2012-19. Thus, the population, which had a peak of 22.69 lakhs in 2007 stands at lowest value in last 42 years at 18.26 lakhs with a decline rate of 19.52% over last two censuses.

Himalayan regions including Himachal Pradesh had traditionally witnessed high livestock populations (Chand 1995, Shrestha 1998). However, as the dairy productivity improved through breed improvement, the region witnessed decline in cattle population (Sati and Singh 2010). The crossbred cattle increased by 8.64% in 2012-19 period but non-descript/indigenous cattle declined by -34.86% in the same period. The state showed marked improvement in breed through expansion of veterinary institutional infrastructure (Kumar and Lal 2012). Reason for decreased non-descript/indigenous cattle could be decline in feed resources and open grazing areas as observed in other Himalayan regions (Tulachan 2001). Scarcity of fodder and feed is rampant in Himachal Pradesh, as most of the fodder and grazing areas have been infested by non-palatable invasive species such as *Lantana*, *Eupatorium* and congress grass (Pratap 2011).

Table 1. Livestock and poultry population (in million) of India during 1977-2019

Species	1977	1982	1987	1992	1997	2003	2007	2012	2019
Cattle	180	192.45	199.6	204.5	198.8	185.1	199.0	190.90	192.52
Buffalo	62	69.78	75.97	84.21	89.92	97.92	105.3	108.7	109.85
Goat	75	95.25	110.2	115.2	122.7	124.3	140.5	135.17	148.88
Sheep	41	48.76	45.70	50.78	57.49	61.47	71.56	65.07	74.26
Equine	1.99	2.05	1.93	1.98	1.93	1.58	1.19	1.15	0.54
Pig	7.60	10.07	10.63	12.79	13.29	13.52	11.13	10.29	9.06
Yak	0.13	0.13	0.04	0.06	0.06	0.06	0.08	0.08	0.06
Total livestock	369.0	419.59	445.29	470.86	485.39	485.0	529.70	512.06	535.78
Poultry	159.2	207.74	275.3	307.07	347.6	489.0	648.8	729.21	851.81

Table 2. Percentage change in livestock and poultry population (India) during 1977-2019

Species	1977-82	1982-87	1987-92	1992-97	1997-03	2003-07	2007-12	2012-19
Cattle	6.92	3.76	2.45	-2.79	-6.89	7.50	-4.10	0.83
Buffalo	12.55	8.87	10.85	6.78	8.90	7.58	3.19	1.06
Goat	25.99	15.71	4.60	6.45	1.34	13.01	-3.82	10.14
Sheep	18.93	-6.28	11.12	13.21	6.92	16.41	-9.07	14.13
Equine	3.01	-5.85	2.59	-2.59	-18.13	-24.68	-3.36	-53.04
Pig	32.50	5.56	20.31	3.91	1.73	-17.66	-7.54	-12.03
Yak	0.0	-69.23	50.0	0.0	0.0	28.0	-7.64	-24.47
Total livestock	13.71	6.13	5.74	3.09	-0.08	9.22	-3.33	4.63
Poultry	30.49	32.54	11.53	13.20	40.68	32.68	12.39	16.81

Buffalo population

India: Buffalo population has increased from initial census (1977-82) to till latest census (2012-2019) (Table 1). Maximum growth rate (12.55%) was seen during 1977-82, after that it stayed around 7-8% till 2007. The growth rate slowed down to 3.19% during 2007-12 and further to 1.06% during 2012-19 (Table 2). Buffalo population rose from 62 million in 1977 to 105.3 million in 2007 and currently stands at 109.85 million. Buffalo population growth has slowed, as female buffalo population increased but male buffalo population decreased at much faster rate in recent times. Total male buffalo population decreased by -17.83% during 2007-12 and by -42.35% during 2012-19 period while female population increased by 7.99% during 2007-12 and by 8.61 % during 2012-19 (GoI 2012, 2020).

Relative importance attached to buffalo as draught animal power has gradually declined. Mechanization is the main reason for reduction in draught cattle population including buffalo bullocks. Mortality rate among male buffalo calves remain very high due to neglect, as they are not perceived to be economically beneficial (Kumar *et al.* 2013). In 2010, Government of India initiated "Salvaging and Rearing of Male Buffalo Calves" (SRMBC) scheme that provides funding to state governments to extend subsidies and/or loans to livestock farmers to encourage them to rear, rather than dispose off, young male buffaloes. But, that project reportedly had not a noticeable impact so far (FICCI 2013). Insufficient funds in SRMBC scheme and stringent slaughter policies in most Indian states had resulted in failure to protect male buffalo calves and

consequently the population is declining at alarming rate. Therefore, overall buffalo population growth rate had slowed down (Natarajan *et al.* 2016).

Himachal Pradesh: Buffalo population showed positive trend from 1977 to 2003 and declined continuously from 2003 to 2019. Buffalo population stood at 5.61 lakhs in 1977, increased to 7.74 in 2003, but declined to 6.46 lakhs in 2019 (Table 3). The decline rate has been increasing -1.68% (2003-07), -5.91% (2007-12) and -9.78% (2012-19) with every census (Table 4). Thus, buffalo population has shown a similar trajectory of declining growth rate as of cattle population in the state and reasons could be very much similar as explained previously.

Goat population

India: Goat population increased by 25.99% in 1977-82, 15.71% in 1982-87, 4.60% in 1987-92, 6.45% in 1992-97, 1.34% in 1997-2003 and 13.01% in 2003-07 (Table 2). Thus, it stood at 140.5 million in 2007 and declined by -3.82% to 135.2 million during 2007-12. However, it increased again by 10.14% to reach 148.88 million in 2019 (Table 1). Therefore, goat population has witnessed steady increase over 1977-2019 and population has increased from 75.0 million in 1977 to 148.88 million in 2019.

Production and demand for food of animal origin showed positive trend due to increase in population size and purchasing power, which favour rise in goat population in India (Weber *et al.* 2018). Goats are the most desired species of animals for meat production in India and the demand is rising continuously (Kumar 2007). Besides meat,

Table 3. Livestock and poultry population (In lakhs) of Himachal Pradesh during 1977-2019

Species	1977	1982	1992	1997	2003	2007	2012	2019
Cattle	21.05	21.75	21.65	21.73	22.36	22.69	21.49	18.26
Buffaloes	5.61	6.13	7.01	7.48	7.74	7.61	7.16	6.46
Goat	10.36	10.62	11.21	11.68	11.25	12.40	11.19	11.08
Sheep	10.54	10.92	10.79	10.80	9.26	9.01	8.05	7.91
Equine	.28	.35	.36	0.13	0.18	0.13	0.15	0.088
Pigs	---	---	---	0.07	0.03	0.02	0.05	0.024
Yak	---	---	---	0.03	0.02	0.017	0.029	0.02
Total livestock	---	51.23	51.16	52.24	51.16	52.16	48.44	44.11
Poultry	---	4.61	6.6	8.65	7.67	8.10	11.05	13.41

* Data unavailable for the period has been left blank (---).

Table 4. Percentage change in livestock and poultry population of Himachal Pradesh during 1977-2019

Species	1977-82	1982-92	1992-97	1997-2003	2003-2007	2007-12	2012-19
Cattle	3.32	-0.46	0.37	2.9	1.47	-5.29	-15.03
Buffaloes	9.27	14.35	6.70	3.47	-1.68	-5.91	-9.78
Goat	2.51	5.56	4.19	-3.68	10.22	-9.75	-0.98
Sheep	3.60	-1.19	0.09	-14.26	-2.69	-10.65	-1.74
Equine	25.0	2.86	-63.89	38.46	-27.78	15.38	-41.33
Pigs	---	---	---	-57.14	-33.33	150.0	-52.0
Yak	---	---	---	-33.33	-15.0	70.59	-31.03
Total livestock	---	-0.14	2.11	-2.07	1.95	-7.13	-8.94
Poultry	---	43.17	31.06	-11.33	5.61	36.42	21.36

*Data unavailable for the period has been left blank (---).

milk and skin production has also strong projected growth rate till 2050 and population in the country is expected to reach 216 million in 2050 (CIRG 2015).

Himachal Pradesh: Goat population increased by 2.51% during 1977-82, 5.56% during 1982-92, 4.19% during 1992-97, 10.22% during 2003-07, and declined by -3.68% during 1997-03, -9.75% during 2007-12 and -0.98% during 2012-19 (Table 4). Goat population stood at 10.36 lakhs in 1977 and attained peak of 12.40 lakhs in 2007 and stands at 11.08 lakhs in 2019 (Table 3). Thus, there had been slow growth in goat population and also witnessed negative growth rate in last two census period. Grazing areas in the state have been diminished which has resulted decline in ovine population in Himachal Pradesh (Sharma and Shilpa 2016). No serious attempts seemed to be made for meat production in the state as production has declined from 4406 tonnes in 1991-92 to 3965.77 tonnes in 2011-12 recording fall rate of -0.52% per annum (Kumari 2016).

Decline in goat population might be due to lack of awareness to adopt supplementary feeding, proper housing, prophylaxis, poor marketing infrastructure for goat rearing, non-availability of good quality breeding males and their excessive use are the major concerning problems for decline in goat population (Peacock 2005).

Sheep population

India: Sheep population in India grew by 18.93% in 1977-82, declined by -6.28% in 1982-87, increased by 11.12%, 13.21%, 6.92%, 16.41% during the period 1987-92, 1992-97, 1997-2003, 2003-07, respectively; declined by -9.07% in 2007-12 and again increased by 14.13% in 2012-19 (Table 2). Sheep population increased from 41.0 million in 1977 to 74.26 million in 2019 (Table 1). Thus, the population off sheep has grown at a steady pace except two census period of 1982-87 and 2007-12. Positive growth rate may be due to increased demand of mutton, lower disease incidences as compared to other livestock species (Prabhu *et al.* 2012).

Himachal Pradesh: Sheep population grew by 3.60% in 1977-82, declined by -1.19% in 1982-92, increased by 0.09% in 1992-97, continuously decreased by -14.26%, -2.69%, -10.65%, -1.74% during 1997-2003, 2003-07, 2007-12 and 2012-19, respectively (Table 4). Sheep

population, which was 10.54 lakhs in 1977 increased to 10.88 lakhs in 1997 and has been continuously declining in every census and stands at 7.91 lakhs in 2019 (Table 3).

Negative growth rate in sheep population can be attributed due to decline in traditional migratory sheep husbandry practices, non-remunerative price of wool fetched by farmers over last 10-15 years, easy management practices of goats over sheep and increase in the demand of chevon over mutton (Sankhyan and Thakur 2019). Pastures of migratory shepherds have been disturbed by afforestation activities, road construction, tourism, army establishments, agricultural expansion and deterioration of pasture land. Further discourage by government of Himachal Pradesh to migratory grazing due to misplaced perception of threat to forest resources also resulted in decline of migratory sheep and goat grazing (Sharma *et al.* 2003) which forms 70% of sheep and goat population of the state (Misri 1998). Goat based pastoralism has thrived because of strong demand of meat and ability to make wide use of vegetation by goats (Sharma and Shilpa 2016) Thus, it can be concluded that sheep and goat production in Himachal Pradesh has not kept pace with the country as the predominant form of sheep and goat rearing, i.e. pastoralism has been severely hit by various factors (govt. policies, shrinkage of grazing areas, etc.).

Equine population

India: Equine population grew by 3.01% in 1977-82, declined by -5.85% in 1982-87, increased by 2.59% in 1987-92, decreased continuously by -2.59% in 1992-97, -18.13% in 1997-2003, -24.68% in 2003-07 and -3.36% in 2007-12.

The decrease has been more sharp (-53.04%) from 2012 to 2019 (Table 2). It decreased from 1.99 million in 1977 to 0.54 million in 2019 (Table 1). Adoption of new technology is the most important reason of decline in the importance of the horses. Modern means of transport (petrol and diesel vehicles) have pushed the majority of these pack animals to the terrains and hilly areas (Fazili and Kirmani 2011).

Himachal Pradesh: Equine population showed positive growth rate during 1977-82 (25.0%), 1982-92 (2.86%), 1997-2003 (38.46%) and 2007-12 (15.38%), however it showed negative trend during 1992-97 (-63.89%), 2003-07 (-27.78%) and 2012-19 (-41.33%) (Table 4). Equine

population rose from 0.28 lakhs to 0.36 lakhs in 1992 and has fallen to 0.08 lakhs in last census period (2012-19).

Mule population had declined by -12.44% from 2012 to 2019 whereas donkey population declined from 0.07 million in 2012 to 0.05 million in 2019. Road links to the villages having modern means of transport, disliking by younger generations and non-availability of locally-bred mules are major perceived factors for decline in population (Chauhan 2008).

Pig population

India: Pig population grew by 32.50% in 1977-82, 5.56% in 1982-87, 20.31% in 1987-92, 3.91% in 1992-97 and 1.73% in 1997-2003 (Table 2). So it increased from 7.60 million in 1977 to 13.52 million in 2003. The population thereafter steadily declined by -17.66% in 2003-07, -7.54% in 2007-12 and -12.03% in 2012-19. So population stands at 9.06 million in 2019. Both crossbred and indigenous breeds of pig witnessed strong decline in 2012-19 census. Cultural and consumer perceptions about pork meat, has resulted its consumption only limited to north eastern India (Chauhan *et al.* 2016).

Other parts of the country are reluctant to consume pork because of their religious beliefs. Uttar Pradesh, which had significant pig population of 1.33 million showed staggering decline of -63.17%, reduced its population at 0.41 million during 2012-19 (GoI 2021). Even current programs on development of piggery have special focus to north-eastern part of India only (DAHDF 2021).

Lack of quality breeding boar (Parimala and Mazhar 2020), unavailability of feed and fodders, lack of organized markets, government support for piggery, lack of operating capital, inadequate access to credit (Deka *et al.* 2007), diseases like classical swine fever, porcine reproductive and respiratory syndrome (PRRS), etc. (GAIN 2016) are major challenges faced by piggery sector in India.

Himachal Pradesh: Population of pig which stood at 0.07 lakhs in 1997 declined to 0.02 lakhs in 2007 (Table 3). It showed growth of 150.0% during 2007-12 to reach 0.05 lakhs and again declined by -52.0% to 0.024 lakhs. Thus, piggery sector has been unable to take-off in the state due to cultural and consumer perceptions about pork meat.

Yak population

India: Yak population remained constant (0.13 million) from 1977 to 2003, (0.06 million) from 1992 to 2003 and (0.08 million) from 2007-12 (Table 1). The overall yak population estimated as 0.06 million in 2019 dropped by -24.47% compared to previous census in 2012 (0.08 million). The suspension of commercial trading with neighboring countries, where yak was used as transport animal led to decrease in economic value of yak and lack of employment as transporters, leading to decline in yak population (Pal 1993).

Population of yak is rapidly declining in India for variety of reason ranging from reproductive disorders, improper nutrition and degradation of natural grasslands

(The Hindu 2010). Rejuvenating degraded pastures, improving livestock healthcare practices and providing feed supplements for yaks can help to reduce the dwindling population (Sharma 2018).

Himachal Pradesh: The maximum growth rate in yak population was observed during period 2007-12 (70.59%). Declining trend in yak population was observed during the period 1997-2003, 2003-07 and 2012-2019 (-33.33, -15.0 and -31.03%, respectively) (Table 4). Yak population has stayed around 2000 since 2003 in the state. Most of them are present in Spiti region of the state where they are used for milking and ploughing (Mishra *et al.* 2003).

Total livestock population

India: Total livestock population has witnessed increasing trend in most of the census period. The livestock population has increased from 369.0 million to maximum of 535.78 million in latest census of 2019.

Himachal Pradesh: Total livestock population showed decline in every census except from 1997-2007. The decline has been sharper as -7.13% and -8.94% in recent two censuses. Total livestock has been declined from maximum of 52.16 lakhs to 44.11 lakhs in recent census.

Poultry population

India: Poultry population grew by 30.49% in 1977-82, 32.54% in 1982-87, 11.53% in 1987-92, 13.20% in 1992-97, 40.68% in 1997-2003, 32.68% in 2003-07, 12.39% in 2007-12 and 16.81% in 2012-19 (Table 2). Poultry population increased from 159.2 million in 1977 to 851.81 million in 2019 (Table 1). Thus, it showed positive growth rate across all the census periods. Increased income, preference of poultry products, market integration has led to transformation of poultry sector in India (GoI 2020). The poultry population in the country had grown impressively and the growth was maximum during the period 1997-2003 (40.68%). This enterprise has slowly changed from a mere backyard activity to a major commercial activity. Robust growth in the poultry population was triggered by increasing market demand and substantial private investment in this sector. The reason for positive trend may be access to good quality chicks, good infrastructure, veterinary healthcare, good management practices, proper pricing mechanism, etc.

Himachal Pradesh: Poultry population grew by 43.17% during 1982-92, 31.06% during 1992-97, 5.61% during 2003-07, grew much faster at 36.42% during 2007-12 and also grew at fast rate of 21.36% during 2012-19 (Table 4). There is decrease in the poultry population only during 1997-2003 period, where it decreased by -11.33% in the state. The population which was 4.61 lakhs in 1982 reached to 7.67 in 2003 and to 13.41 lakhs in 2019 (Table 3). Per capita consumption of eggs and meat showed marked increase among rural population from 2004-05 to 2009-10 (Grant Thornton 2015). This trend in increased consumption of poultry products have resulted in rise in poultry population in the state.

The livestock population trends of India and Himachal Pradesh show contrast. Total livestock population was increased from 369.0 million to a peak of 535.78 million in India. On the other hand, Himachal Pradesh showed sharp decline from peak of 52.16 lakhs to 44.11 lakhs in recent census. Cattle population of India has stayed in the range of 190-200 million in most of the census. Himachal Pradesh reported lowest cattle population of 18.26 lakhs in the latest census. The trend is similar in other livestock species such as buffalo and sheep which showed decline in their population. Whereas, regular growth has been seen in buffalo and sheep population in most of census period in India. Poultry population has shown increasing trend in India as well as in Himachal Pradesh. Necessary steps such as focus on fodder cultivation, safeguarding common grazing land, provision of timely livestock health care services, creation of organized market facilities for livestock products, access to credit facilities, etc. are required to improve the livestock population.

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