



LIVESTOCK OUTPUT AND FACTORS AFFECTING ITS GROWTH IN HIMACHAL PRADESH

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ABSTRACT:

The livestock provide milk, wool, mutton, hides, skin, transport and manure etc. and is of immense economical value to the farmers of Himachal Pradesh. Thus livestock is not only contributing towards agricultural production but also is a source of self-employment to rural people of the Himachal Pradesh. In fact, the livestock sector acquires special importance for a hilly state like Himachal Pradesh both on economic and ecological grounds. The state is also bestowed with the natural treasures of vast hydro-electric potential, lush green pastures, different types of forests and typical flora and fauna which are not found elsewhere in the plains.

KEYWORDS – livestock provide milk, mutton, economic and ecological grounds

INTRODUCTION

Temperate hilly regions of the Pradesh are ideally suited to the exotic milk yielding animals and Marino sheep. Growing livestock intensity is no proof of livestock output growth in the economy. There are enumerable issues which need to be taken up while discussing the livestock sector development in an economy. The development of livestock sector mainly depends upon two things i.e. output and productivity of this sector. Though, the development of livestock sector is traditionally judged in terms of employment generation coupled with its contribution in SDP yet, it is primarily the production and productivity of the sector which needs to be focused.

OBJECTIVES OF THE STUDY

1. To study the growth of Livestock output in Himachal Pradesh and;
2. To analyse the various factors affecting growth of livestock output in Himachal Pradesh.

DATA AND METHODOLOGY

The study was based on the secondary data collected from such sources as different issues of Livestock Census, Integrated Sample Surveys for Estimation of animal Product, Annual Season and Crop Reports and various issues of Statistical Outlines of Himachal Pradesh. Simple tabular analysis and Annual Compound growth rates were used as the tool for studying the objectives of this study. Growth rate (r) was worked out as:



$$r = \left\{ \left[\frac{P_t}{P_0} \right]^{\frac{1}{t}} - 1 \right\} \times 100$$

Where, P_t is the end point (year) data, P_0 is the starting point (year) data and t is the number of years.

Regression analysis is used to analyses and estimate the effect of various factors on livestock output.

$$Y_i = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_7X_7 + e$$

Where Y_i = Gross Value of Livestock Output and X_i are the explanatory variables.

X_1 = Ratio of in-milk bovine to total bovine

X_2 = Number of artificial insemination performed

X_3 = Number of veterinary institutions

X_4 = Road Length

X_5 = Membership of dairy co-operatives

X_6 = Area under fodder crops

X_7 = rainfall

It is supposed that quality of herd, infrastructure for output marketing, availability of fodder, veterinary facilities, natural factors and technology are independent variables affecting livestock output in the economy. Quality of herd is measured in terms of in-milk bovine to total female bovine population. Higher is this ratio, lower is the share of unproductive animals and higher is the output. Artificial insemination is meant primarily to improve the quality of offspring. Road length affects output in more than one way, most significantly by providing market outlets for milk and other livestock products. The role of dairy co-operatives in mobilization of small dairy producers and mopping up marketed surplus at remunerative prices is quite well known and hardly requires any elaboration. This variable is measured by taking the number of milk producer selling their produce to dairy cooperatives. Area under fodder crops is used to represent availability of green fodder for livestock.

IMPORTANCE OF LIVESTOCK SECTOR IN HIMACHAL PRADESH

The state of Himachal Pradesh is regarded as the model of hill development not only in India but in the entire Hindu-Kush-Himalayan region. Generally it is credited with the cultivation of apple and off-season vegetables. Livestock in hills forms an integral part of the age-old crop-livestock mixed farming system.¹

The importance of livestock in the economy of Himachal Pradesh is evident from the percentage share of livestock in gross value of output (Table 1). In the year 2011-12, the percentage share of livestock in gross value of agriculture output stood as high as 42.59 per cent. However, in the year 2013-14 there was a net fall in the gross value of livestock output. As a result the percentage share of livestock in agriculture output dipped to 29.62 per cent. However, in the year 2014-15 and 2015-16 the gross value of livestock output recorded a net increase leading to a spur in the percentage share of livestock in agriculture output to 34.59 per cent and 36.41 per cent respectively. The percentage share of livestock in gross state domestic product stood at 4.42 per cent in the year 2011-12 and fell to 3.52 per cent in the year 2015-16. It is on account of growth of other sectors (other than agriculture) in Himachal Pradesh.

Table 1
Contribution of Livestock in State Gross Domestic Product of Himachal Pradesh at Constant Prices

¹ Kumar Virender, H.R. Sharma and R.K. Sharma (2004), "Livestock Economy of Himachal Pradesh Growth Pattern, Ecological Implications and State Policy," Agricultural Economics Research Review, Vol. 17, January- June, p. 58.

Years	State Gross Domestic Product	Gross Value Of Agriculture Output	Gross Value Of Livestock Output	Percentage Share of Agriculture In SGDP	Percentage Share of Livestock Output in Agriculture	Percentage Share of Livestock In SGDP
2011-12	7271983	755425	321713	10.39	42.59	4.42
2012-13	7738426	835797	326894	10.80	39.11	4.22
2013-14	8284669	1013727	300252	12.24	29.62	3.62
2014-15	8903164	971573	336051	10.91	34.59	3.77
2015-16	9599374	933263	339819	9.72	36.41	3.54
Growth Rate (in %)	5.71	4.31	1.10	-1.32	-3.08	-4.36

Source : Gross State Domestic Product (2011-12 base) Economics & Statistics Department, Government of Himachal Pradesh

An analysis of growth reveals that as compared gross value of agriculture output (4.31%), gross value of livestock output (1.10%) recorded very nominal rate of growth. The performance of agriculture and livestock sector appears all the more disappointing in the state, if the growth of percentage share of agriculture in gross state domestic product (-1.32%), percentage share of livestock in agriculture (-3.08%) and the percentage share of livestock in state domestic product (-4.36%) are analysed. These trends are to some extent similar to that observed at the national level. It seems that due attention which needs to be paid to the growth of agriculture and its allied sector is not given by the state. Hence, their contribution to the economy is fading away slowly.

Growth of Livestock Output (Milk, Meat, Eggs and Wool) in Himachal Pradesh

Table 2 revealed that total milk production in Himachal Pradesh recording a rate of growth 2.62 per annum. As against it at the all India level recording a rate of growth of 4.04 per cent per annum more viz-a-viz Himachal Pradesh. District-wise analysis revealed that in district Kullu(5.51%) milk production increased at the highest rate followed by kinnaur (4.38%) and Mandi (4.16%). As against it, milk production increased at the lowest rate in district Hamirpur (0.86%), Sirmaur (1.15%) and Chamba (1.27%)

Table 2
District Wise Growth of Livestock Output in Himachal Pradesh (1995-2015)
(per cent/Year)

District	Milk	Meat	Eggs	Wool
Bilaspur	2.2	4.04	6.35	-3.02
Chamba	1.27	-3.86	-0.05	-0.45
Hamirpur	0.86	-1.68	0.43	0.35
Kangra	3.04	1.61	-0.94	-0.74
Kinnaur	4.38	7.02	7.16	3.39
Kullu	5.51	-1.09	3.8	1.72
Lahaul-Spiti	2.95	0.14	3.08	1.52
Mandi	4.16	0.88	-0.87	1.14
Shimla	3.01	0.18	1.72	1.35
Sirmaur	1.15	-0.7	0.42	-3.11
Solan	1.63	4.45	7.62	-3.25
Una	2.09	3.73	9.41	-6.79
H.P	2.62	0.54	2.08	0.33

India	4.04	1.69	5.44	0.63
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Source: Integrated Sample Survey Reports of various relevant years of Animal Products Published by Directorate of Animal Husbandry Government of Himachal Pradesh.

Total meat Production in Himachal Pradesh recording a rate of growth of 0.54 per cent per annum and at the all India level, it recorded a rate of growth of 1.69 per cent per annum. District-wise analysis revealed that there are eight districts where meat production has increased. It recorded highest rate of growth in district Kinnaur (7.02%) followed by Solan (4.45%) and Bilaspur (4.04%). On the contrary, it declined at the highest rate in District Chamba (-3.86%) followed by Hamirpur (1.68%) and Kullu (1.09%).

Since eggs provide adequate quantity of animals protein, and as such, play an important role in the dietary habits of the people, their production is of special significance. The analysis revealed that in Himachal Pradesh growth of egg production is less i.e 2.08 per cent as compared to all India level i.e 5.44 per cent per annum. Thus there is a need to increase the eggs production in Himachal Production. District-wise analysis revealed that egg production recorded highest rate of growth in district Una (9.41%) followed by Solan (7.62%) and Kinnaur (7.16%). On the contrary, egg production declined at the highest rate in District Kangra (-0.94%) followed by Mandi (0.87%) and Chamba (0.05%).

The Production of wool in Himachal Pradesh marginally increased over a period of time and recording a rate of growth of 0.33 per cent per annum. The analysis revealed that only in six district wool production has increased. It recorded highest rate of growth in district Kinnaur (3.39%) followed by Kullu (1.72%) and Lahaul-Spiti (1.52%). On the contrary, it declined at the highest rate in district Una (-6.79%) followed by Solan (-3.25%) and Sirmaur (-3.11%).

Correlation between Livestock Output and Related Variables in Himachal Pradesh

In a small state like Himachal Pradesh an insight of the factors which determine the livestock output is analysed. Correlation between livestock output and various variables like in-milk bovine, artificial insemination, veterinary institutions, road length, membership of dairy co-operative, fodder area and rain fall in Himachal Pradesh is shown in Table 3. Gross value of livestock output is positively correlated with ratio of in-milk bovine and correlation coefficient is 0.606 (significant at 1 per cent level). It is so because higher is the ratio of in-milk bovine to total bovine higher is the milk output and so on.

Gross value of livestock output is highly positively correlated with artificial insemination. The value of correlation co-efficient is 0.992 (significant at 1 per cent level). Artificial insemination is done primarily to improve the quality of offspring by crossbreeding. Higher is the rate of cross-breeding better is going to be the quality of livestock and hence higher is going to be the livestock output.

There is a positive correlation between gross value of livestock output and number of veterinary institutions. With an increase in number of veterinary institutions, livestock output also increases. It is quite understandable that with the coming up of veterinary institutions the quality of livestock tends to improve hence leading to higher yield and output.

Gross value of livestock was found to be significantly correlated to the road length. Livestock output is perishable and having small shelf life. It has to be transported to the markets in no times. Hence road infrastructure is a prerequisite for the growth of livestock output.

Milk co-operative societies are a major step towards the upliftment of the milk producers in an area. With this in mind an attempt is made to find the relationship between gross value of livestock output and number of milk producers being member of milk co-operative societies. It is observed from the Table 7.38 that Gross value of livestock output is positively correlated with the numbers of milk producers attached to dairy co-operative as the value of correlation co-efficient is 0.979 (significant at 1 per cent level). It implies that when more and more milk producers join dairy co-operative livestock output increases significantly. It is so because dairy co-operatives play a very important role in marketing of milk of both small and big dairy producers and help them in selling their product at rational prices.

Further, it is observed that gross value of livestock output is positively correlated with area under fodder crops. The value of correlation co-efficient is 0.832. Increase area under fodder crops implies more green fodder for livestock which increases the health and productivity of the livestock.

However, there was only one determinant i.e. rainfall which had negative but insignificant relationship with value of livestock output.

Table 3
Correlation between Gross Value of Livestock Output and Related Variables in Himachal Pradesh

	Ratio of in-milk Bovine	Artificial Insemination	Veterinary Institutions	Road Length (in Km.)	Member of Dairy Cooperative	Fodder Area	Rain Fall
Gross Value of Output	.606** (.000)	.992** (.000)	.973** (.000)	.966** (.000)	.979** (.000)	.832** (.000)	-.196 (.282)

Note: ** 0.01 level of significance

Determinants of Livestock Output in Himachal Pradesh

Multiple regression analysis was run to estimate the effect of various variables like availability of fodder, quality of herd (ratio of in-milk bovine), infrastructure for output marketing (road length and dairy co-operatives), veterinary facilities (veterinary institutes), natural factors (rainfall) and technology (artificial insemination) on livestock output at current prices for thirty one years (1984-85 to 2014-15). Various transformations to remove multicollinearity were tried and the best model where the assumptions were fulfilled was retained. The dependent variable is converted to natural log form and all the independent variables were standardized with the help of Z- score and then regression was run.

Table 4 Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
	.996 ^a	.992	.990	.08458	1.464

a. Predictors: (Constant), Zscore: Rainfall(in mm), Zscore: Fodder Area(in Ha), Zscore: Ratio of in-milk Bovine, Zscore :Vety.Institutions, Zscore: membership of Dairy, Zscore: Road length (InKm), Zscore:Artificial Insemination

b. Dependent Variable: GVO

The Table 4 shows equation is good fit as R^2 and adjusted R^2 values are 0.992 and 0.990 respectively. The value of R^2 indicates that around 99 per cent of the variation in the livestock output is explained by these independent variable like i.e. the ratio of in-milk bovine, artificial insemination, number of veterinary institutions, road length and fodder area which is significant at 1 per cent level.

Table 5 Regression ANNOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	22.405	7	3.201	447.434	.000 ^a
	Residual	.172	24	.007		
	Total	22.577	31			

a. Predictors: (Constant), Zscore: Rainfall(in mm), Zscore: Fodder Area(in Ha), Zscore: Ratio of in-milk Bovine, Zscore :Vety.Institutions, Zscore: membership of Dairy Co-operative, Zscore: Road length (InKm), Zscore:Artificial Insemination

b. Dependent Variable: GVO

Table 6 Regression Coefficient

Dependent Variable	Unstandardized Coefficients		Standardized coefficient	t- value	p- value
	B	Std. Error			
Gross value of Livestock Output			Beta		
Constant	11.576	.015		774.233	.000**
Zscore: Ratio of In-Milk Bovine	.098	.028	.115	3.497	.002**
Zscore: Artificial Insemination	.184	.128	.215	1.433	.165
Zscore: Veterinary Institution	.245	.074	.287	3.299	.003**
Zscore: Road Length (in Km.)	.653	.115	.766	5.673	.000**
Zscore: Membership of Dairy- Coperative	.080	.830	.094	0.959	.347
Zscore: Fodder Area (ha.)	.149	.049	.174	3.066	.005**
Zscore: Rainfall (in mm.)	-.007	-.019	-.008	3.650	.718

Note: ** 1% level of significance
* 5% level of significance

The standardized B value (Table 6) shows that infrastructure for output marketing, measured in terms of the road length has the strongest impact on livestock output. One unit increase in road length resulted in 0.653 unit increase in livestock output.

The other two most important factors affecting livestock output in Himachal Pradesh were number of veterinary institutions and fodder area. The analysis revealed that with one unit increase in number of veterinary institutions, the output of livestock sector increased by 0.245 units. Similarly one unit increase in fodder area in the state leads to 0.149 unit growth in livestock output. Elasticity of livestock output with respect to herd quality which is reflected in terms of ratio of in-milk bovine was 0.098 unit.

CONCLUSIONS

The study revealed that in Himachal Pradesh growth of livestock product i.e milk, meat, eggs and wool was low viz-a-viz at all India level. Thus livestock sector required more attention in Himachal Pradesh.

It was observed that Gross value of livestock outputs was found to be significantly positively correlated with the ratio of in-milk bovine, artificial insemination, veterinary institution, road length, membership of dairy co-operatives and fodder area. With an increase in number of veterinary institutions, livestock output also increases. It is quite understandable that with the coming up of veterinary institutions the quality of livestock tends to improve hence leading to higher yield and output. Artificial insemination is done primarily to improve the quality of offspring by crossbreeding. Higher is the rate of cross-breeding better is going to be the quality of livestock and hence higher is going to be the livestock output. Dairy co-

operatives play a very important role in marketing of milk of both small and big dairy producers and help them in selling their product at rational prices. An increase in area under fodder crops implies more green fodder for livestock which increases the health and productivity of the livestock.

It is observed that infrastructure for output marketing, measured in terms of road length has a very strong impact on livestock output. Livestock output is perishable and having small shelf life. It has to be transported to the markets in no times. Hence road infrastructure is a prerequisite for the growth of livestock output. Number of veterinary institutions and fodder area emerged as the other important factors affecting livestock output significantly in Himachal Pradesh.

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