

Transforming livestock economy in India with special reference to Punjab: A review

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ABSTRACT

The present study examined livestock economy of Punjab. The growth rate was ranged between from -0.61 to 7.98 per cent per annum from the year 1997 to 2012 for different species of livestock in Punjab. The overall growth rate was found to be 3.27 per cent per annum for total livestock population in Punjab over the years. Though the decrease in livestock bovine population, the milk production in Punjab had increased from 3.22 to 9.71 million tonnes and per capita availability of milk increased from 541 to 961 gram per day with an impressive growth rate of 3.51 and 1.82% per annum from year 1980-81 to 2012-13. The milk production of India had reached up to 137.7 million tonnes during the year 2013-14. With the advancement of the livestock sector, the veterinary officers, insemination centers, and veterinary hospitals had also shown an overall growth rate of 0.65, 1.96 and 0.07 per cent per annum respectively from the year 1980-81 to 2012-13. The egg production in Punjab has also shown a positive trend over the years. The egg production in Punjab has increased from 2961.3 to 3724.6 million with an overall growth rate of 2.11 per cent per annum from the year 1980-81 to 2013-14. The % share of Punjab in the country is decreasing over the years with a negative growth rate of 3.29 per cent per annum. With increasing population and urbanization, the demand for goat and poultry meat is increasing over the years with an impressive growth rate of 1.09 per cent per annum from the year 1980-81 to 2013-14. The livestock sector has great potential for increasing income and employment and also reduces income inequality among rural farmers. The study has suggested that appropriate policy measures should be undertaken to strengthen veterinary services, marketing of livestock products and improving the breed of animals for developing a strong livestock economy of the state.

Keywords: Livestock economy, milk production, egg production and slaughterhouses.

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Punjab is one of the smallest states covering only 1.53% geographical area of the country. The state of Punjab in India, been one of the world's most remarkable examples of agricultural growth (Dhawan and Singh, 2015) But Rice-wheat system in the farming economy of Punjab has not only attained its potential but also led to depletion of soil and water reserves of the state. The technology has shown the signs of fatigue; the

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income growth has slowed down and employment has shrunk. The livestock sector is an important sub-sector of Punjab agriculture. The rice-wheat system in the farming economy of Punjab has not only attained its potential but has also led to depletion of soil and water resources of the state (Sidhu and Johl, 2002). It is one of the remunerative alternatives to the wheat-rice system in Punjab which provide regular income and employment to the households especially small and marginal. If we want to diversify our agriculture from the monoculture of wheat-rice system, livestock sector comes first as next best alternative. Livestock economy is as old as the crop husbandry itself in the agrarian set up. It is being considered as one of the viable options for diversifying the agricultural economy. It is considered a way of life in the rural areas, where livestock animals were raised for different purposes. Livestock husbandry is growing in India at a very large space, the reason for the rapid increase of livestock sector is mainly due to increase income, high-income elasticities, consumption of meat and milk, rapid urbanization, population growth, an increase in middle-class income and changing food habits etc (Iqbal MA, 2013). Livestock provides a regular supplementary income and employment not only to millions of producers in the rural areas but also to very a large number of people engaged in secondary and tertiary business related to livestock business and important occupation and a source of family income for a large number of women in the village. Growth in livestock sector has more potential to reduce poverty to a similar growth in crop sector (Birthal and Taneja, 2006). The contribution of livestock sector to the food basket in the form of milk, eggs and meat have been immense in fulfilling the animal protein requirement of the ever-growing human population (Sharma, 2004). India has a huge livestock population and efficient utilization of these resources including production and utilization of livestock products is important to earn increased returns and sustain livestock production activities by encouraging agro-based industries. Government initiatives should be there for the encouragement of agro-based industries in the Punjab state by imposing fewer taxes, providing high subsidies, cheap electricity facilities, etc (Dhawan and Kashish, 2015). Livestock is also best insurance against the vagaries of nature like drought, famine, and other natural calamities. Distribution of livestock

wealth in India is more egalitarian, compared to land. Hence, from the equity and livelihood perspectives, it is considered as an important component in poverty alleviation programmes. Dairy farming also plays an important role in improving the socio-economic profile of smallholder dairy farmers (Kashish and Dhawan, 2015). The present study has investigated the current scenario of the livestock sector and problems faced by the livestock rearing farmers.

DATA AND METHODOLOGY

The present study was based on secondary data. The data on livestock population, milk production, milk procurement, artificial insemination centers, veterinary institutions, egg and meat production from 1980-81 to 2012-13 etc was collected from various issues of Statistical Abstracts of Punjab, Annual reports of Department of Animal Husbandry and Dairying (DAHD), Government of India, Ministry of Agriculture, New Delhi and indiastat.com.

Descriptive statistics such as percentages and growth rate was used to examine livestock population in Punjab, veterinary institutions, egg production, slaughter houses in Punjab and number of animals killed in Punjab.

RESULTS AND DISCUSSION

Composition of livestock population in Punjab

Though animal serves some purposes their utility has been undergoing to steady transformation driven by the changing food consumption pattern. Livestock as a draught power has declined considerably due to mechanization of agricultural operations and decreasing farm size. The livestock population consists of cattle's, buffaloes, sheep, goat, and poultry, etc. Bovine population (cattle and buffalo) in Punjab was 88.1 thousand during 1997 census which decreased to 80.32 thousand during 2003 census, and further it decreased to 73.43 thousand during 2012 census. Table 1 revealed that the bovine population trend has been decreasing over the years with a negative growth rate of 0.61 per cent per annum for cattle and 1.52 % per year for Buffalo from 1997-2012 census. However, cattle population showed a big leap of change but with negative growth rate mainly due to the prohibition of cow slaughter on the religious ground especially in India (Khan N and Iqbal M A, 2008).

Table 1: Livestock population in Punjab

Sr. No.	Species	Livestock census (lakh)				Growth rate (% age)
		1997	2003	2007	2012	
1.	Cattle	26.4	20.38	17.61	24.27	-0.61
2.	Buffalo	61.7	59.94	50.35	49.16	-1.52
3.	Goat	4.14	2.78	2.92	1.45	-6.82
4.	Sheep	4.36	2.20	2.10	1.28	-7.81
5.	Poultry	54.6	105.34	188.99	167.94	7.98
	Total	151.2	190.64	261.97	244.1	3.27

Source: Statistical Abstracts of Punjab, 2010-11, and 19th livestock Census Report, 2012

The focus of poor livestock households is on small animals like goat, pig, and poultry requiring quick returns. This multiple species animal husbandry system is also environment-friendly (Grover DK and Kumar S, 2012). The ovine (sheep and goat) population which was 8.50 and 4.98 lakh during 1997 and 2003 census decreased to 2.73 lakh during 2012 census with an overall growth rate of - 6.82% per annum for goat and - 7.81 per cent per annum for sheep. The poultry population was 54.6 lakh during 1997 census increased to 188.99 lakh during 2003 census and then showed a massive increase to 167.94 lakh during 2012 census which clearly indicated that poultry population was increasing with an overall growth rate of 7.98% over the years.

Milk production

Dairying is the most important segment of India's livestock economy and is an integral part of the total

farming system. Emerging trends indicated that the demand for milk was growing faster than the production especially given faster growth in GDP. Milk production on the regular scale provided a flow of income throughout the year to the farmers. A crop production being a seasonal income generating activity whereas dairying helped the farmers to meet the daily cash needs of their families. It was also propounded that increased milk production leads to improvement in crop production (through purchase of off-farm inputs) and living standards of rural areas (Dhawan and johl, 1969; Kahlon and Aggarwal, 1967; Kahlon *et al.* 1975; Saini, 1989; Patel, 1981; George and Choksi, 1977 and George, 1996). The dairy enterprise provided more employment opportunities to the farmers. It helped the farmers to engage the semi-employed family labour more efficiently during the slack period of crop production. Also, it also generated employment for landless labourers as well as reduced the income inequality (Singh RKH and Chandar AK, 2015).

The majority of milk producers were smallholders and were contributing more than 70% to total milk production in India (Dries *et al.* 2004, Minten *et al.* 2006, Maertens and Swinnen *et al.* 2006). Mostly, about 70% of milk was produced by smallholder dairy farmers so there is need to increase the productivity of milk to meet the increasing demand by providing some benefits in the form of wages and subsidies to small farmers (Kashish *et al.* 2014).

Table 2: Milk production in Punjab vis a vis India

Sr. No.	Year	Punjab		India		per cent share of Punjab in India
		Milk Production (million Tonnes)	Per Capita Availability (gm/day)	Milk Production (million Tonnes)	Per Capita Availability (gm/day)	
1.	1980-81	3.22	541	31.6	128	10.18
2.	1990-91	5.14	682	53.9	176	9.53
3.	2000-01	7.77	870	80.6	220	9.64
4.	2010-11	9.42	931	121.8	281	7.73
5.	2011-12	9.55	944	127.9	290	7.46
6.	2012-13	9.71	961	132.4	297	7.33
7.	2013-14	10.01	980	137.7	307	7.27
Growth rate (%)		3.48	1.76	4.56	2.69	-0.97

Source: GOI-DAHD, Annual Report, 2013-14

The milk production in India was 31.6 million tonnes during 1980-81 which increased to 121.8 million tonnes during the year 2010-11 and then further increased to 137.7 million tonnes during the year 2013-14 and per capita availability of milk in India was 307 gm per day during the year 2013-14 meeting the minimum nutritional requirement of 250 gm as recommended by Indian Council of Medical Research (ICMR). The milk production showed an upward trend over the years with an overall growth rate of 4.56 per cent per annum for milk production and 2.69 % per year for per capita milk availability.

Milk production is a very important part of the agricultural economy in the state of Punjab. Milk production in Punjab is increasing throughout the year in spite of decrease in bovine and ovine population. The reason being is that government is taking much more emphasis on the breed improvement of dairy animals on the recommendations of National Commission on Agriculture and subsequent expert committee (Acharya, 1990) with this advancement DAHD operating 18 central livestock organizations and allied institutions. The milk production was increased from 3.22 million

tonnes to 10.01 million tonnes from 1980-81 to 2013-14 with a growth rate of 3.48 per cent per annum.

The % share of Punjab in the central pool was decreasing over the years. The % share of Punjab was 10.18 per cent for the year 1980-81 which was reduced to 9.64 % per year during year 2000-01 and then decreased to 7.27 % per year during the year 2013-14.

Veterinary institutions

The significant achievement in livestock sector has been possible due to better animal health and veterinary services in the state without these changes livestock industry can't grow up to that level. At the national level, improving animal health and veterinary services is the foremost priority in the livestock development agenda (Birthal and Negi, 2012). The Veterinary hospitals were 761 in the year 1980-81 which was increased to 1362 during the year 2000-01, then after their number was decreased to 785 in the year 2010-11 and afterwards remains same throughout the year. State Government also employed veterinary extension officers and veterinary inspectors for the help and to disseminate the right information at right time to rural farmers.

Table 3: Veterinary institutions and staff in Punjab (Number)

Sr. No.	Year	Veterinary hospitals	Vet. Hospitals under Zila parishad	Permanent outlaying dispensaries and insemination units	Veterinary officers
1.	1980-81	761	-	798	686
2.	1990-91	891	-	1008	856
3.	2000-01	1362	-	1443	1094
4.	2010-11	785	582	1485	783
5.	2011-12	785	582	1485	757
6.	2012-13	785	582	1485	841
7.	2013-14	785	582	1485	841
Growth rate (% age)		0.07	NA	1.90	0.63

Source: Various issues of Statistical Abstracts of Punjab, 2013 NA- Not Applicable

The number of veterinary officers has increased from 686 to 841 with a growth rate of 0.63 percent per annum from the year 1980-81 to 2013-14. Veterinary officers and dairy development officers also arrange camps and fairs to disseminate information like how to

produce good quality milk, how milk production can be increased by reducing expenditure etc. and about ongoing programmes, projects, and schemes initiated by the state government. These departments also give training to rural farmers and youth for starting up of

new subsidiary occupation like fishery, piggery and poultry, etc. at free of cost and also provide loan facility to initiate new subsidiary occupation. These results are in agreement with findings of Sharma H and Wadhwan V M, 2015.

Egg Production

Poultry production in India has taken a quantum leap in the last four decades, emerging from an unscientific farming practice to a commercial production system with the introduction of new technological practices. India is fifth largest producer of eggs and eighteenth largest producer of broilers. For increasing the egg production and maintaining the nutritive value of egg, DAHD, GOI celebrated world egg day on 10th October 2014 with the coordination of National Egg Coordination Committee, Poultry Federation of India Ltd and state government (DAHD, 2014).

Table 4: Egg Production in Punjab vis a vis India (Million)

Sr. No.	Year	India	Punjab	Percent share of Punjab in India
1.	2001-02	38729	2961.3	7.64
2.	2002-03	39823	3130.6	7.86
3.	2003-04	40403	3068.1	7.59
4.	2004-05	45201	3680.0	8.14
5.	2005-06	46235	3520.0	7.61
6.	2006-07	50663	3774.0	7.39
7.	2007-08	53583	3791.4	7.07
8.	2008-09	55562	3679.0	6.62
9.	2009-10	60267	3282.8	5.44
10.	2010-11	63024	3544.9	5.62
11.	2011-12	66449	3603.0	5.42
12.	2012-13	69731	3724.6	5.34
13.	2013-14	74752	-	-
Growth rate (% age)		5.72	2.11	-3.29

Source: GOI-DAHD, Annual Report, 2013-14

Egg production in India was 38729 million in the year of 2001-02 which increased to 74752 million during the year 2013-14 with an overall growth rate of 5.72 per cent

per annum and egg production in Punjab increased from 2961.3 to 3724.6 million during from the year 2001-02 to 2013-14 with an overall growth rate of 2.11 percent. The percent share of Punjab in India was 7.64 per cent during 2001-02 which was decreased to 5.34 per cent during 2012-13 with an overall negative growth rate of -3.29 percent over the years. These results are by Singh *et al.* 2012.

Meat Production

India has also been showing a continuous increase in its total meat production. This is mainly because of a considerable rise in non-vegetarian population over time. In India, various species of livestock such as cattle buffalo, sheep and goats, pigs and poultry birds are used for meat production. The production of poultry meat is also gaining considerable ground in India. The two main categories of meat consumed in largest quantity in India are the goat and chicken meat. In fact, the population of goat and poultry birds in the country has increased at much faster rate than the population of other species of livestock used for meat production. Increasing population, urbanization and sustained the rise in per capita income are fueling rapid growth rate in demand for animal food products in India (Birthal and Taneja, 2006).

In Punjab, the numbers of slaughter houses were remains same throughout the year. The maximum numbers of slaughtered animals were sheep and goat with 447296 in 1980-81 and increased to 650490 during year 2013-14 with growth rate of 1.12 per cent followed by pigs slaughtered was 14563 during year 1980-81 and it was increased to 12689 during year 2013-14 with growth rate of -0.42 per cent.

ECONOMIC PERSPECTIVES

Grewal and Rangji (1980) worked out the economics of cross bred cows with lactation yield of 3000 litres of milk and at sale price of ₹ 1.40 per litre. It was found that net returns in case of cross bred cows were much higher (₹ 1335) than that of the buffaloes (₹ 789). Labour requirement for dairying and cropping were also calculated. The average animal labour input per cropped hectare for the general field crops was estimated at 138.25 man days per hectare per annum for dairying.

Bal *et al.* (1980) worked out the cost and return from milch animals and contribution of dairy business income to total business income on different sized dairy farms in Punjab state. The average number of milch animals per farm was 2.93, 4.17, 5.27 and 4.06 on small, medium, large and overall sized farm respectively. On an average, dairy business income found to be ₹ 1393.17, ₹ 2779.32, ₹ 1698.99 and ₹ 1747.81 which constituted 15.58, 14.03, 6.38 and 13.16 per cent of the total farm business income in respective farm size groups. The output ratio worked out to be ₹ 1.48, ₹ 1.53, ₹ 1.29 and ₹ 1.43 from milch animals and ₹ 1.69, ₹ 1.76, ₹ 1.64 and ₹ 1.70 from crop production in respective farm size groups. It was concluded that crop production was major profitable than keeping milch animals.

Table 5: Number of recognized slaughter houses and animal slaughtered in Punjab

Sr. No.	Year	Animal slaughtered			Total
		No. of recognized slaughter houses	Sheep and goat	Pigs	
1.	1980-81	89	447296	14563	461859
2.	1990-91	91	328487	20885	349372
3.	2000-01	91	448933	17567	466500
4.	2010-11	91	472550	9627	482177
5.	2011-12	91	485500	10030	495530
6.	2012-13	91	627784	12237	640021
7.	2013-14	91	650490	12689	663179
Growth rate (% age)		0.07	1.12	-0.42	1.12

Source: Various issues of Statistical Abstracts of Punjab, 2014

Grover *et al.* (1992) conducted study in Bathinda district of Punjab to examine the economics of milk production. The average annual net maintenance cost of buffalo and a cow was worked at ₹ 5271 and ₹ 4681 respectively per animal. Green fodders, roughages and concentrates taken together accounted for 68.42 and 73 per cent of the total expenditure on buffalo and cow respectively. The average annual yields of milk per buffalo and per cow were 1216 and 926 litres respectively. Milch animals were maintained in this area more for domestic consumption of milk rather than for sale. The average total cost of production per litre of milk for buffalo and cow came at ₹ 4.34 and ₹ 5.05 respectively. On an average, sample

farms incurred a net annual loss of ₹ 1016 per buffalo and ₹ 1902 per cow. The yield of milk per milch cattle was very low and there was a scope of increasing the yield further by following suitable cross breeding and feeding programmes to make dairy as an economical viable enterprise. Singh and Joshi (2008) conducted study in three districts of Punjab to examine the economic analysis of crop production and dairy farming has been reported for marginal and small farmers in Punjab for the year 2003-04. It has been found that a majority of the farm households are not able to meet their requirements from their income from crops and dairy farming. Further dairy farming has emerged as a major allied enterprise for supplementing the income of marginal and small farmers in Punjab. Income from off-farm sources has been identified another important factor contributing significantly to the disposable income of these farm households. The study has suggested further to exploit the potential of off-farm sources towards meeting the domestic expenditure. Also, the technical efficiency of crops and dairy farming should be improved to provide more income to farmers.

Sran and Goyal (2010) conducted study to estimate the cost and returns structure and compared the economics of both broiler and layer farms in Punjab. The analysis of data collected from about 36 broiler as well as layer farms of different sizes were selected randomly from the six agro-climatic zones in Punjab in 2008-09. The study concluded that the broiler farming has been found more profitable venture as compared to layer farming. However, there is still enough scope in reducing the cost of production and increasing the profitability in poultry farming by educating the farmers to adopt scientific management through effective training, technology transfer programmes, own feed manufacturing/mixing, purchasing superior stock of day-old chicks, using labour-saving devices and efficient use of labour, reducing mortality, culling unproductive birds and following proper replacement policy to get the maximum egg production at the time of highest prices of eggs in the market. To ensure a remunerative price to the producer and a reasonable price for the consumer, a suitable marketing system must be organized on a priority basis.

Meena *et al.* (2010) compared the cost and returns from milk production across members and non-members of dairy cooperative societies in Alwar district of Rajasthan. The results of study revealed that that net cost of maintaining buffalo was relatively higher in case of member group (₹ 47.99 per day) as compared to non member group (₹ 44.22 per day) while corresponding figures for maintaining a cow was ₹ 38.42 and ₹ 36.56 respectively. The net maintenance cost was found to be decreased with the increase in herd size category in both member and non member groups. The per litre cost of buffalo milk production was lower for members at ₹ 11.43 than non members at ₹ 11.60. The corresponding figures for cow milk production were ₹ 10.20 and ₹ 10.50 respectively. The net income of buffalo per day was relatively higher in case of member group (₹ 7.38) compared to non-member group (₹ 2.70) while corresponding figures for maintaining a cow was ₹ 5.37 and ₹ 1.82. Thus it is concluded that buffalo milk production was relatively more profitable than the cow in the study area and the cost of milk production was lower for members than non members for both buffalo and cow.

Ghule *et al.* (2012) carried out an analysis of capital investment, cost, return and profitability was, based on the data collected from 40 dairy farms of Ahmednager district in Maharashtra. The selected farms were of three types, large medium and small. The commercialization in dairy leads to increase in production and income. The cattle productivity in terms of milk was found higher for small dairy farms compared to medium and large farms. The authors concluded that the dairy farming is highly capital intensive but the investment pattern was different for small and large farms as large farms invested more in cattle while the major investment of small farms was in development of infrastructure. Commercial dairy farms preferred to have their own fodder cultivation instead of dependence on purchased fodder. As feed cost was the highest contributor of the total cost.

Sarkar *et al.* (2008) conducted a study of cost, return and profitability of cooperative and non cooperative dairying in West Bengal. A survey of 320 household was conducted. The analysis of costs revealed that the

variable cost was the major component of total cost for both cooperative and non cooperative dairy farms. Feed cost and Labour cost were found to be the two major components of variable costs. Interest cost was found to be the major component of fixed costs. NPV, IRR and Benefit cost ratios were the techniques used to evaluate the financial performances of dairy farms. The authors found that some cooperatives, named as good cooperatives showed better performance than rest of all dairy farms which included bad cooperatives and non cooperative dairy farms.

Kaur *et al.* (2012) conducted study on cost of Milk Production in Punjab. The realistic cost estimates of milk production are required to be made on the basis of study of comprehensive milk production system through survey of dairy farmers as in case of rice and wheat, where minimum support price is fixed on the basis of comprehensive analysis of cost of cultivation. Therefore, project entitled "Economics of milk production and its regular monitoring in Punjab" was undertaken in this direction to study the investment pattern, cost of milk production and net returns from milk production across different categories in three zones of Punjab state viz. Sub-mountainous zone, central zone and south-western zone. The cost of milk production of buffaloes and cows on per litre basis was highest in central zone. The dairy enterprise profit from buffaloes per day per milch animal on per litre basis was found to be the highest in zone central zone i.e. ₹ 6.24 per litre and that of cows in zone south-western zone i.e. ₹ 3.52 per litre. Category wise, dairy enterprise profit per day per milch animal on per litre basis increased with increase in herd size both in case of buffaloes and cows. Singh *et al.* (2010) conducted study on economics of broiler production in Punjab. To achieve the objectives of study primary data was collected from 140 broiler farmers for the period march 2008 to February 2009 in three districts of Punjab. The study has shown that the total fixed investments per bird have been highest on small farms, followed by medium and large farms. The total variable cost per bird has been found highest on small farms followed by medium and large farms. The total cost of meat production per bird has been found highest on small broiler farms, followed by medium and large farms. The net returns per bird over the variable cost have been

recorded highest on large farms and economies of scale prevail on these farms. The meat- feed price ratio and benefit cost ratio have been found to be increase with increase in farm size of broiler farms. On the basis of present value, benefit cost ratio and internal rate of return, investment in broiler farming has been found profitable in all farm sizes, it being most profitable on large farms followed by medium and small farms. The small broiler farms have been observed highly sensitive to increase in costs and decrease in net returns. The study has observed that broiler farming is a profitable venture and has a bright future in Punjab agriculture for improving economic status of the farming community. Kashish (2014) conducted study on role of dairying in augmenting income and employment of small holder dairy farmers in Punjab. He concluded that the cost of feed and fodders across different farm size forms the major portion of the variable cost. Among the variable costs feed and fodder cost were found to be the higher cost component with ₹ 330.83, ₹ 391.28, ₹ 463.89 and ₹ 468.58 per day per household on landless, marginal, small and other dairy farmers respectively. On an average feed and fodder cost accounted for 83.84 per cent share out of the total variable cost. The total fixed investment was amounted to be ₹ 346760, ₹ 398680, ₹ 453725 and ₹ 491870 for landless, marginal, small and other dairy farmers and on an average basis the total fixed investment was amounted to be ₹ 423093.75. Interest on fixed investment was major item of fixed cost and it accounted for ₹ 31208.4, ₹ 35881.29, ₹ 40835.25 and ₹ 44268.30 for landless, marginal, small and other dairy farmers respectively. Resource use efficiency was studied by using Cobb-Douglas production function by assuming milk production as a dependent variable and green fodder, dry fodder, concentrates, labour hours and veterinary charges as independent variables. This indicated that total variations in returns from milk were explained by the variables included in the selected regression model ranged from 80 per cent for the selected dairy farmers. The coefficients of dry fodder and concentrates were positive and significant indicating increase in feed and fodder items these will increase the milk productivity. The coefficients of dummy variable D_1 and D_2 were negative and significant indicating that milk productivity incase of landless and

marginal farmers was significantly lower than the milk productivity incase of small and other farm households.

Employment Generation

Sidhu *et al.* (2004) studied the impact of dairy farming on income and employment in Punjab. The study revealed that the livestock economy especially dairy is considered to be an economically viable alternative for increasing income and employment in the farm sector of Punjab. It is clear that the contribution of livestock economy to the farm sector has increased over time whereas the contribution of crop sub-sector to the agricultural growth as well as NSDP has declined due to stagnation/fall in productivity of important crops, rise in fixed cost and degradation of soil and water resources. The importance of dairy especially on small and marginal farms has increased and the proportion of dairy income to the total farm business income on these farms has increased. The farm business income from dairy on an average farm increased from ₹ 6216 during 1987-90 ₹ 10547 during 2000-03 at constant prices at annual growth rate at 4.66 per cent while the farm business income from crops went up from ₹ 26426 to ₹ 35027 respectively during this period at growth rate of 2.08 per cent per annum. The demand for labour in the crop sector decreased continuously by 23 per cent from 385 man days per farm during triennium 1987-89 to 297 man days during 2000-03. However dairying helped in generating employment in the farm sector during this period. The use of labour on an average increased from 182 mandays in 1987-89 to 257 mandays in 2000-03 showing an absolute increase of 75 mandays employment and proportional increase of 41 per cent. The economic sustenance of these farmers is primarily dependent on dairy enterprise as it helped in utilizing their surplus family labour, requires less land and water resources and provides cash income to meet their daily consumption needs. The dairy sector has also helped in generating employment on small, marginal and semi-medium farms despite fall in employment in crop production.

Kashish (2014) conducted study on role of dairying in augmenting income and employment of small holder dairy farmers in Punjab. He concluded that Dairying

provides 234.53 mandays employment to landless farmers, 243.29 mandays employment annually to marginal farmers, 255.69 mandays employment annually to small farmers and 279.18 mandays employment to other dairy farmers. On an average basis the share of dairying in family income was 30.82 per cent. Crop income contributed 35.01 per cent to the total family income. Gross income from dairying was accounted to be ₹ 306946.80 for landless, ₹ 397644.90 for marginal farmers, ₹ 458120.60 for small and ₹ 511401.50 for other dairy farmers respectively. The gross income clearly shows that it increased with increase in herd size. On an average the gross income was to the tune of ₹ 418528.45 per household per annum. The net annual income from dairying was ₹ 128264.40, ₹ 189984.50, ₹ 214992.90 and ₹ 260555.20 for landless, marginal, small and other dairy farmers respectively.

Constraints

Singh *et al.* (2005) conducted study to estimate the economic losses due to diseases in dairy animals in Amritsar district. For the purpose of the study, data were collected from 20 small, 28 medium and 12 large farmers from Chogawan and the Verka blocks during 2001-02. The study revealed that the maximum percentage of animals diseased were in the rainy season (20.11%), followed by winter (13.49%) and summer (12.96%) season. The reproductive diseases viz. repeat breeding, anoestrus, abortion and tick borne fever were the major diseases which caused economic losses to the farmers. Economic losses due to diseases in Amritsar district were of ₹ 84.66 crores. It was brought out that significant part of these losses can be controlled by more intensive veterinary extension services and by more intensive research in this field by imparting better education to the farmers in respect of animal diseases and health problems.

Bhangoo (2007) carried out economic analysis of dairy farming in rural Punjab and concluded that most of dairy farmers are facing the problems relating to marketing, production and veterinary in dairy farming. About 94 per cent respondents reported that there is absence of good marketing network in the state the farmers are forced to sell their milk to the Private Milk Vendors (PMV) and about 79 per cent farmers complained that

the payment from the cooperative societies is often delayed adding unnecessary harassment to them. Another problem is the inadequacy and absence of medicine and health care for milch animals are pointed out by 88 per cent of farmers and they were reportedly aware about substandard quality and very high cost of medicines and most relevant problem is the ignorance and inadequate knowledge about quality breed animals in general and about cows in particular was also reported by nearly 67 per cent of farmers. Many times they are being misled and financially exploited by the traders dealing in animals.

Kumar and Kumar (2003) observed that the major constraints faced by small and marginal farmers in dairy farming were low price of milk (96.67% and 100.00%), followed by high cost of feeds and fodder by high costs of feeds and fodders (93.33% and 100.00%), non-availability of land for fodder cultivation (86.67% and 96.67%), less fat content in crossbred cow milk (70.00% and 96.67%), and non-availability of loans and lengthy procedure (66.67% and 83.33%), respectively.

Kaur *et al.* (2010) examined the production and marketed surplus of milk on different sized commercial milk producing units in Punjab. The study revealed that marketed surplus of milk increased with increase in production on small, medium and large categories of milk producers which accounted for 86.48, 92.45 and 97.37 per cent of total milk production on the respective categories. Large producers preferred to sell their produce to organized sector (Cooperative Societies) because of assured off take of produce, reduced price uncertainty, lower marketing and transaction costs and an easy access to inputs, technology, credit and services. The reasons for preferring milk vendors by small sized milk producers was mainly associated with cash payment which vendors often advanced to producers for their urgent needs.

Kumar *et al.* (2011) studied milk marketing chains in Bihar and Punjab states of India. They reported that in spite of growing presence of modern milk supply chains in the Indian milk market, the traditional milk supply chain is still dominant. Its dominance is even more pronounced in less developed states like Bihar. In Bihar 93.8 per cent of marginal milk producing households

sell milk to traditional marketing channels and only 6.3 per cent sell milk to modern milk marketing channels. In Punjab 92.2 per cent of marginal milk producing households sell milk to modern milk marketing chains and only 7.8 per cent sell milk to traditional milk marketing channels. However it is apparent that the traditional chain is being replaced, *albeit* slowly with the commercialization of dairying. However, the modern milk supply chain appears to be inclusive (landless, small, marginal) are not excluded from the modern milk supply chain.

Kashish *et al.* (2014) examined marketed surplus, disposal pattern of milk and constraints faced by smallholder dairy farmers in Punjab. For the purpose Amritsar district was selected and a sample of 80 dairy farmers consisting of 20 dairy farmers each from landless (LL), marginal (MR), small (SM) and others (OT) categories were selected from two blocks and four villages of Amritsar district. It was found that milk production, consumption and marketed surplus has direct relationship with farm size. The average production of milk was 27.55, 37.05, 40.95 and 45.2 litres/day for LL, MR, SM and OT dairy farm and per capita availability of milk was 690, 843, 869 and 935 gm/day which was quiet above the national average of 290 gm/day and minimum recommendation of ICMR of 250 gm/day. On an overall basis 11.26, 6.40, 7.40 and 18.12 litres of milk/day was sold by sample households through dairy cooperatives, private milk processors, milk vendors, consumers and halwaiis. Except MR farmers rest all of the selected dairy farmers sold their produce through modern milk marketing channels which includes milk cooperatives and private milk processor in the study area. Thus SM holder dairy farmers have equal access to modern milk marketing channel in the study area. Various constraints ranked by dairy farmers as costly feed and fodder ranked first followed by lack of A.I. and veterinary facilities in village. The lack of organized milk marketing was at the bottom of the constraints identified by dairy households. The sample dairy farmers faced all the constraints with almost equal intensity irrespective of the size categories.

State Government Programmes

For the development of livestock sector state government provides loan facility, subsidies for purchase of Bulk

Milk Containers (BMC), Chaff cutter, loan facility for the purchase of buffaloes and cows, provides free vaccination for various diseases like brucella, thaleria, foot and mouth disease and HS etc. and also gives free ten days training to rural youth. State governments also arrange the National Livestock Championship every year at Sri Muktsar Sahib District of Punjab to enhance the livestock farming. In this championship there is competition between breeds of cows, buffaloes, dogs, horse's sheep's and goats. There is also Competition between milking of cows and buffaloes, milking of goats etc. Farmers participate from different states like Himachal Pradesh, Haryana, and Rajasthan etc and won good prizes. Now a day's state government is also focusing on the development of subsidiary occupations like poultry, piggery and fish farming because the income from agriculture sector was decreasing over the years. To stabiles the farm income there is need to enhance livestock farming from subsistence level to commercial enterprise.

Problems

Despite impressive growth in livestock during the past three decades, and adoption of dairy farming, poultry farming as a commercial activity, there exist some constraints which are faced by farmers are as follows:

Feed and fodder

Farmers are not aware about balanced feed for their animals and which micro elements are required to animals to overcome the deficiencies. They don't know that what to do during lean season of availability of fodder. Higher cost of feed is a major problem. Farmers generally see which feed is cheaper they generally buy those bags, but they don't know that which raw material was used to make a feed. They don't know whether the nutrients are present in those feeds which are essential for their animals. Low digestibility in improving utilization, scarcity of protein will be other major constraint of cattle feed (Patel RK, 1993)

Another major constraint of feed is demand and availability gap between feed and fodder in the country. According to annual report of DAHD the demand of dry fodder was 416 million tonnes but the availability was only 253 million tones with a gap of 40 per cent and

the demand of green fodder was 222 million tones and availability was only 143 million tones with a gap of 36 per cent. The area under fodder is not sufficient to fulfill the demand of fodder and second is the cost of dry fodder varies from ₹ 250 to ₹ 650 per quintal during the lean season. Large farmers make hay and silage for the future use or during lean period of dry fodder but in case of marginal and small dairy farmers they were unable to perform such practices due to lack of sources land.

Artificial insemination and veterinary facilities

Currently state government has developed 46 artificial insemination centers with the collection of 58 cow-bulls, 81 buff-bulls in semen bank. But the calves born were less than 15 per cent of AI carried out (Kurup, 1991). Veterinary facilities in the village were not up to that mark. Among landless, marginal, small and other categories of dairy farmers the second main constraint was lack of artificial insemination and veterinary facilities in villages with overall mean score of 54.93. During serious problems like difficult birth, high fever and other diseases, farmer's visit cities to get proper treatment of their animals (Kashish *et al.* 2014).

Low productivity of dairy animals

Productivity of dairy animals is very low due to poor plan of nutrition, low genetic potential for milk production and absence of genetic improvements. In spite of India's position as the highest producer of milk, the average milk yield from cattle and buffalo is only 1214 kg as against the world average of 2104 kg per lactation.

CONCLUSION

Livestock sector continuously making an important contribution to the Indian economy as well as in agriculture sector. The negative growth trend was seen for population of all livestock animals except for poultry population. The growth rate of all livestock animals was observed to be 3.27 per cent per annum from year 1997 to 2012. Besides decrease of population of milch animals in Punjab, the milk production in Punjab has increased with a growth rate of 3.51 per cent per annum from year

1980-81 to 2012-13. The per capita availability of milk is higher in Punjab as compared to other states of India. To meet the infrastructural requirement and for better growth of livestock sector, there has been an impressive increase in veterinary institutions and staff in the Punjab state. The number of insemination units and officers has increased with a growth rate of 0.07, 1.96 and 1.65 per cent per annum respectively from year 1980-81 to 2012-13. Egg production in Punjab has increased from 2961.3 to 3724.6 million with a growth rate of 2.11 per cent per annum from year 2001-02 to 2012-13. The per cent share of egg production of Punjab in India was decreasing over the years. With the increasing population and per capita income the demand of livestock product was increasing over the year. Poultry and goat meat is generally preferred by non-vegetarian population and impressive growth rate was found to be 1.09 per cent per annum for poultry and goat meat from year 1980-81 to 2012-13. There has been significant progress in terms of milk production, introduction of new germ plasm, cooperative institutions, marketing of milk and evolving new technologies etc. The livestock sector not only proved to be a good source of income generation but also gave employment opportunities to the unemployed. So, appropriate policy measures should be undertaken to strengthen animal health, improving breed of animals, veterinary services, proper marketing of livestock products and providing necessary services and information for strong livestock economy of Punjab.

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