Original Research

An Analysis of Economic Sustainability of Gaushalas in Haryana

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Rec. Date:	Mar 13, 2019 06:51
Accept Date:	Jun 07, 2019 17:05
DOI	10.5455/ijlr.20190313065125

Abstract

Cow is revered by more than 70% of the population of our country. Although the cattle population of the country is dominated by indigenous cattle, but the population of crossbred cattle has increased significantly. This poses threat to genetic diversity of our indigenous cattle. There is yet another problem of large number of stray cattle in the country and their number is still increasing. Gaushalas are good alternative to manage the ever-increasing stray cattle population and also to conserve our deteriorating genetic base. Hence, it becomes important to study how economically the Gaushalas are managed provided the type of animals they keep. For this purpose, Haryana was selected as this state has initiated many programs for indigenous cattle conservation and particularly for Gaushalas. To study the economic sustainability, economic sustainability index was developed using six indicators viz. net income per animal, returns over variable cost per animal, autonomy, donations, proportion of productive animals and employment generation. Karnal and Yamunanagar were highly sustainable with ESI values of 0.80 and 0.77 respectively. Panipat, Kaithal and Ambala gaushalas were found to be moderately sustainable with ESI values 0.57, 0.51 and 0.37 respectively. While, Hisar gaushala in western part of the state was found to be the least sustainable Gaushala with very low ESI 0.15 followed by other Gaushalas viz. Jind, Bhiwani and Rohtak gaushalas with low ESI values viz. 0.18, 0.21 and 0.21 respectively. Overall ESI was 0.30 for whole sample which shows lower sustainability of Haryana gaushalas.

Key words: Diversification, Economic Sustainability Index, Functioning, Gaushalas, Indigenous Cattle

How to cite: Bijla, S., Singh, A., Khalandar, S., & Sharma, P. (2019). An Analysis of Economic Sustainability of Gaushalas in Haryana. International Journal of Livestock Research, 9(7), 171-188. doi: 10.5455/ijlr.20190313065125

Introduction

Earlier India was not much competent in agriculture sector in the world but the two turning points in Indian history i.e. "Green Revolution" and "White Revolution" have changed the scenario of Indian agriculture

significantly over the years. Livestock sector currently contributes 25.8 % to agricultural GDP and 4.5% to country's GDP (Department of Animal Husbandry, Dairying and Fisheries, 2018), India. India is having more than half of the cattle of the world. Although the total cattle population is dominated by indigenous cattle with 79% as against 21% crossbred cattle population, but the population of crossbred cattle has increased significantly from 7% in 1992 to 21% in 2012, and those of indigenous cattle has declined from 93% in 1992 to 79% in last census conducted in 2012 (Government of India, 2014). This situation sounds the alarm as the diverse genetic base of India is becoming narrow which is a threat to sustainability. Indigenous cattle are source of A2 milk and are resistant to harsh weather of the country. One of the main reasons for such a declining trend in the population of indigenous cattle can be considered as abandoning of these cattle once they pass their milking stage and become uneconomical to the farmers. These abandoned cattle are then either seen scrounging in garbage dumps in the cities or will finish up in slaughter houses. But cow slaughter is banned in India due to religious taboos. Furthermore, there are several rules and legislations in India which makes both cow slaughter and sale of beef cognizable and non-bailable offences.

Hence, it is clear that solutions to these problems are complex because of the social taboos and various religious sentiments attached to it. There are several attempts to relax the rules on slaughter ban but the states currently making their bans stricter. Farmers are poor and have fewer options. Thus, there is a need to find alternative way to manage these animals. The solution lies in maintaining the dairies adequately, creating huge Gaushalas with adequate space and funds, at appropriate locations, which can house thousands of such cattle and proper public and government cooperation.

Need of the hour suggests that Gaushalas provide better alternative to manage these poor cattle. Though Gaushala has diverse purposes, its main aim is to provide shelter to stray cattle, improve the health of infirm, unproductive, diseased and abandoned cattle. Along with that, Gaushalas help in conserving the Indian germplasm and cow progeny. Some Gaushalas are involved in upgrading the local breeds and use them to supply plenty of pure indigenous milk & other products prepared particularly from cow dung and cow urine and supply the best female calves to the villagers. But these Gaushalas are facing various problems on several aspects, particularly on economic front due to lack of government support, delays in funding, less space and feed availability etc. Thus, it is important to find economical ways with which they can run and provide shelter to large number of animals on sustainable basis. This paper attempts to find out strong and weak areas of economic sustainability of Gaushalas in Haryana aiming at improving the sustainability of Gaushalas.

Materials and Methods

DOI 10.5455/ijlr.20190313065125

Sampling

Haryana state was selected purposively for the study. The state is a non-coastal state in northern India. The total geographical area of Haryana is 4.42 m ha contributing which is 1.4% of total geographical area of the country. The state has contributed significantly to the Green Revolution in India in the 1970s that made the country self-sufficient in food production. Haryana's agriculture GDP contribution to the country is 14.1%. Dairy farming is also an essential part of the rural economy. Haryana has a livestock population of 10 million head. Milk and milk products form an essential part of the local diet which is considered as staple food of the state. Haryana, with 660 grams of availability of milk per capita per day, ranks at number two in the country as against the national average of 232 grams (Government of Haryana, 2017). There is a vast network of milk societies that support the dairy industry. Haryana has emerged as the most proactive state in the country as far as protection and sheltering of Gauvansh is concerned.

Total cattle population in Haryana is 18, 08, 116, out of which indigenous cattle consist of about 45%. There are large numbers of registered Gaushalas in Haryana *i.e.*392 which maintain about 7% of total cattle of Haryana. These Gaushalas at present are maintaining more than 3 lakh cattle in the state. Number of stray cattle in Haryana is 1, 17, 209 and this number is increasing incessantly (Government of India, 2014). These stray cattle also cause huge menace in the form of accidents and crop losses due to grazing in farmers' fields. There is also stricter ban on cow slaughter as compared to other states, according to *Haryana Gauvansh Sanrakshan and Gausamvardhan Act, 2015* which replaced the earlier act Punjab Prohibition of Cow Slaughter Act, 1955 due to its ineffectiveness and low conviction rate. Such rules are now becoming stricter due to more attention of the present government in this direction. The state Gaushala Sangh has also formulated minimum standards of processes and procedures for Gaushalas.

Various other schemes for cow protection and conservation of indigenous cattle in Haryana have been started in the recent past like scheme for conservation and development of indigenous cattle (*Gausamvardhan*) (2015-16), scheme for establishment of Gau Abhayaranya in the state (2015-16) under which 40 *Gau Abhayaranya* (cow sanctuaries) will be established in the state for accommodation of the stray cattle. Gau Seva Ayog has also been setup for the protection of cows, their breed development and modernization of Gaushalas' infrastructure (Department of Animal Husbandry & Dairying, Haryana. 2015). New schemes have also been started namely *Nandi gram*, *Gau Chikitsalya* for treatment and upkeep of injured and infirm cattle. First *Nandi gram* has been inaugurated in Karnal district of the state. There is also a new scheme to open Gaushalas in those jail premises which have adequate space for the purpose. In first phase, it will be opened in six districts of the state and first of these cow sheds will come up in the Karnal district. All these programmes are just in their initiation phase only. Thus, to tackle the problems we still have to rely on these primitive cow shelters which still has huge scope of improvement and then being self-sustainable, these shelters can fulfil their various objectives leading to welfare of these animals.

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Selection of Districts and Gaushalas

Based on the information available at official site of Haryana Gaushala Sangh, Department of Animal Husbandry and Dairying, Government of Haryana and other sources such as Gaushala activities, one feasible Gaushala was selected from each of the ten selected districts. Based on the information available at official site of Haryana Gaushala Sangh and Department of AH&VS, Government of Haryana, 10 Gaushalas were selected on the basis of diversified activities in the form of cow protection, breed conservation, production of cow-based products etc. Gaushalas from each district were selected from 2-3 active Gaushalas in the districts and those who were supportive in providing required information. Thus, from the eastern side Ambala, Yamunanagar, Karnal, Panipat and Kurukshetra were selected; from the central region Kaithal and Rohtak were selected and Hisar, Bhiwani and Jind were selected from western region of Haryana. Table 1 shows the name of the selected Gaushalas from their respective districts and number of animals kept in them during 2016.

Table 1: Average number of animals kept in the Gaushalas

S. No.	District	Name of the Gaushala	Number of Cattle (2016)
1	Ambala	Shri Krishan Gaushala, Naraingarh	1588
2	Bhiwani	Shri Gaushala, Bhiwani	2248
3	Hisar	Shri Haryana Gaushala, Hansi	3144
4	Jind	Rashtriya Gaushala, Dharoli,	3098
5	Kaithal	Shri Kurukshetra Gaushala, Kaithal	1982
6	Karnal	Shri Krishan Gaushala, Karnal	982
7	Kurukshetra	Shri Krishan Gaushala, Laadwa	584
8	Panipat	Shri Gaushala Samiti, Panipat	2884
9	Rohtak	Akhil Bhartiya Gaushala, Peharawar	5775
10	Yamunanagar	Shri Gaushala, Jagadhari	752

Gaushala Records, 2016

Data

The present paper is based on both primary and secondary data. Primary data was collected on covered and farm area of the Gaushalas, quantities and prices of milk and other products made, expenditure incurred on green fodder, dry fodder, concentrates, labour and salaries of employees, veterinary expenses, inventory with each Gaushala**.** Secondary data was collected on the number of Gaushalas in different districts of Haryana, number of animals, their composition, amount of public and other donations, government grants, members' contribution, miscellaneous income and expenditures of Gaushalas. The data was collected consecutively for three financial years *i.e.* 2014, 2015 and 2016 (Triennium ending) which was averaged out for further calculations.

Methods

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Economic Sustainability of Gaushalas

While sustainability is a broader concept, on the other hand a farm, Gaushala in this case is only a small subsystem which interacts with the surrounding environment in various ways, indicators are needful to know whether a farm system is moving towards sustainability or not. Economic sustainability can be equated to the economic viability of farming systems, *i.e.* their ability to be profitable. In case of Gaushalas, it can be defined as their efficiency and competence which can be enunciated through various economic indicators. There are large numbers of indicators that can be computed but all do not cover all dimensions at all levels. As far as Gaushala is concerned, farm level indicators may not provide requisite policy inferences and their estimation and quantification can be difficult given type of animals and objective of animal keeping. Hence, these indicators were modified accordingly and analyzed.

Steps for Determining Economic Sustainability Index (ESI)

Step 1: Selection of Economic Indicators

The first step is to select indicators according to the conditions of the study area. For development of ESI, economic indicators were used which are primarily quantitative in nature. They are expressed mainly in monetary terms or as ratios or percentages. The various indicators used to develop the economic sustainability index are given below (Table 2).

Table 2: Economic indicators

S. No.	Indicators	Variable Used	Units	Effect on Sustainability
1	Net Income	Net income/ No. of animals	₹/ animal	Positive
2	Returns over Variable cost	(Gross returns - Variable cost)/ No. of animals	₹/ animal	Positive
3	Self sufficiency	(Total sales / Gross income) *100	Percentage	Positive
4	Donations	(Total donations / Gross income) *100	Percentage	Negative
5	Percentage of productive animals	(No. of productive animals / total no. of animals) *100	Percentage	Positive
6	Employment Generation	Labour Hours / day	Hours /day	Positive

Net Income per SAU

First of all, net income was obtained by deducting total expenses from gross income then dividing it by number of cows in Gaushala. It has a positive effect on sustainability.

$$\text{Net Income} = \frac{\text{Gross returns} - \text{Total cost}}{\text{Standatd Animal Units}}$$

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Returns over Variable Cost

If this indicator comes out to be positive, then it shows that particular Gaushala is able to meet its variable cost. This indicator has positive effect on sustainability. It was calculated as-

$$\text{ROVC} = \frac{\text{Gross returns} - \text{Variable cost}}{\text{Standatd Animal Units}}$$

Self Sufficiency/ Autonomy

Proportion of income obtained from the sales of Gaushala products. It includes the income sources other than obtained from government grants and donations. It shows the self-sufficiency of Gaushala.

1. **Donations**
   The contribution of donations and government grants was calculated here. It shows the dependency of Gaushalas on outside sources. For a gaushala to be sustainable, this indicator should be less.
2. **Percentage of Productive Animals**
   The variables required here was total no. of cattle, diseased, unproductive, non-lactating animals in the Gaushala. For sustainability, this indicator should be high. Here, productive animals include: in milk and pregnant cows, in milk and not pregnant cows, dry and pregnant cows, pregnant heifers and service bulls.
3. **Employment Generation**
   This indicator shows the contribution of Gaushala in employment generation. It was calculated as number of labour hours per day for each Gaushala. It was calculated by multiplying number of laborers with the total work hours generated by Gaushala in a day.

Step 2: Data Collection and Normalization

After selection of indicators, relevant data was obtained for 3 consecutive years *viz.* 2014, 2015 and 2016 which was averaged out for final calculation. After that data normalization was done to bring all the indicators to a common scale so that they can be further aggregated to form index. For this, Min-max technique was used-

$$\text{Ii} = \frac{\text{Xi} - \text{Min Xi}}{\text{Max Xi} - \text{Min Xi}} \quad \text{..... (1)}$$

$$\text{Ii} = \frac{\text{Max Xi} - \text{Xi}}{\text{Max Xi} - \text{Min Xi}} \quad \text{..... (2)}$$

Where, X_i = Value of i^{th} indicator

i = 1, 2, 3……. n Indicators

DOI 10.5455/ijlr.20190313065125

Equation (1) was used for indicators having positive effect on economic sustainability such as net income, returns over variable cost, self-sufficiency and employment generation. Equation (2) was used for indicators having negative effect on economic sustainability such as donations.

Step 3: Assigning Weights

After getting the normalized value of the indicators, the weights were assigned to them with the help of expert opinion of 30 experts (scientists at National Dairy Research Institute as well as from other universities). Based on average expert opinion, the weights were calculated as:

Table 3: Weights assigned to indicators according to expert opinion

Indicators	Weights
Net income per SAU	28.13
Return over variable cost	19.33
Self sufficiency	15.53
Donations	12.07
Percentage of productive animals	14.63
Employment generation	10.3

Step 4: Aggregation and Development of Economic Sustainability Index

The next step after assignment of weights to the indicators is to compute the economic sustainability index by aggregating all the indicators and it was calculated as follows-

$$ESI = \frac{\sum WiIi}{\sum Wi}$$

Where,

ESI = Economic Sustainability index for each Gaushala
Ii = Normalized value of i^{th} indicator
Wi = Weight given to each indicator from experts
n = Number of indicators

Step 5: Classification of Gaushalas

The full scores in each indicator would result in a maximum ESI = 1 and minimum would be ESI = 0. To separate the more sustainable Gaushalas from less sustainable Gaushalas, the Gaushalas were grouped into three categories based on their value of ESI, *i.e.* Gaushala with ESI < 0.33 were considered as less sustainable, 0.33 < ESI < 0.66 were considered as moderately sustainable, while Gaushala with ESI > 0.66 were considered as highly sustainable. This method was used for the purpose of making the sample Gaushalas evenly distributed.

Results and Discussion

DOI 10.5455/ijlr.20190313065125

General Profile and Functioning of Gaushalas

This section of the paper gives a brief idea of the general profile and functioning of Gaushalas. General information about total and farm area of the Gaushalas gives us an insight into whether the Gaushalas have enough area as well as farm area. Similarly, the composition of animals gives us an idea about the type of animals kept in the Gaushala. Functioning of the Gaushalas gives an idea about the organizational structure, major activities performed by them, their aim etc. Thus, various such aspects are discussed below-

Total Gaushala Area and Farm Area

Land is very important to accommodate animals in gaushala. The increasing population of cows can be maintained properly only when there is adequate space in the Gaushala. The farm area is also important to fulfill the need for green fodder in the Gaushala. The total area and area under fodder crops for the sample Gaushalas is depicted in Fig. 1. Panipat gaushala has highest covered (6.6 ha) as well as farm area (10 ha). Kurukshetra Gaushala has the lowest covered area (1.1 ha). Some Gaushalas like Ambala, Bhiwani, Karnal and Kurukshetra are not having farm area. They completely depend on purchased fodder for feeding cattle. While it was found that some gaushalas like Yamunanagar and Panipat, they give their land on rent to others for cultivation and other purposes. The Gaushalas in Jind, Kaithal, Hisar, Panipat and Rohtak were cultivating green fodder on their own farm area. On an average, the sample gaushalas had 3.9 hectare covered area and 5.2 hectare farm area.

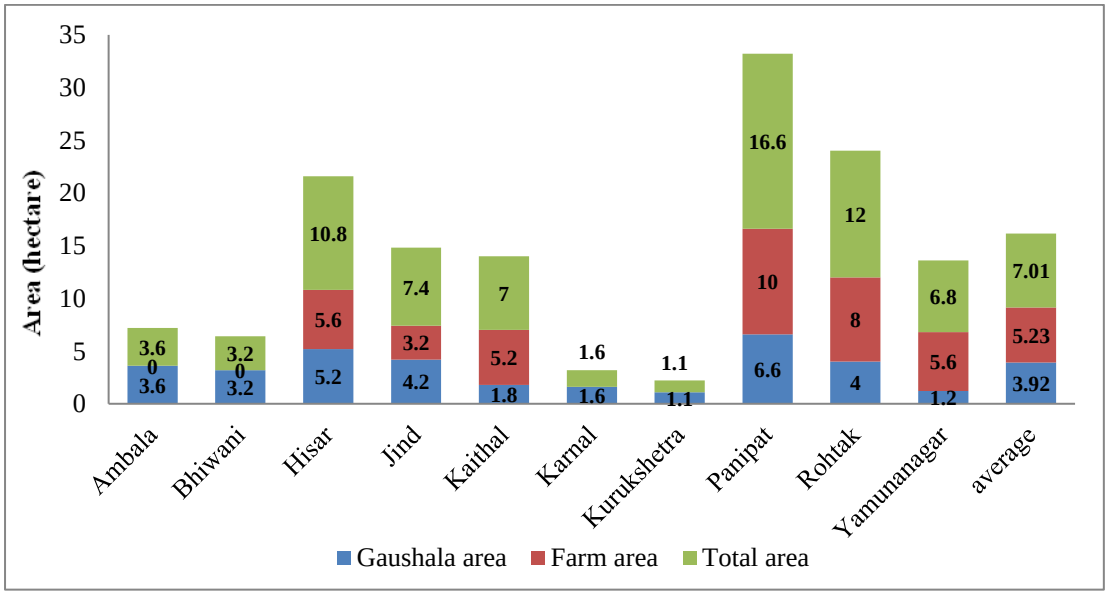

Fig. 1: Gaushala (Total and farm area in hectares)

DOI 10.5455/ijlr.20190313065125

Composition of Cattle in Gaushalas

The composition of herd for the Gaushalas is presented in Fig. 2. The total cattle population comprised of adult females, adult males, heifers, calves below year age and calves above 1 year age. Fig. 2 revealed that the majority of cattle kept in gaushalas consisted of adult females (57%) followed by adult males (23%).

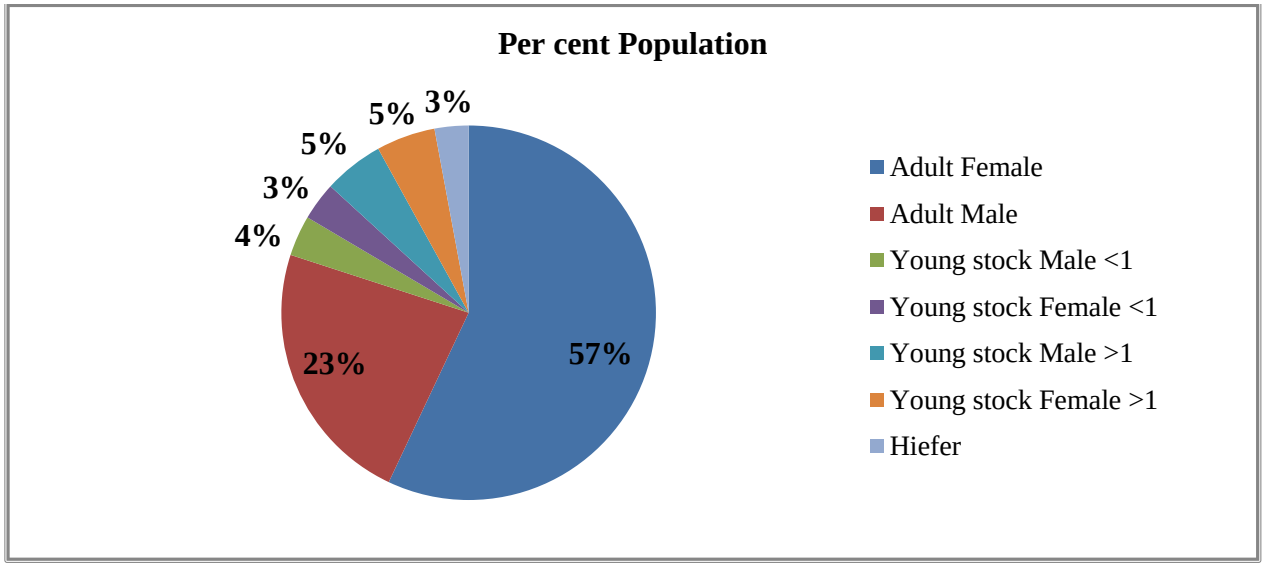

Fig. 2: Composition of cattle kept on Gaushala

Organizational Structure of Gaushalas

The Gaushalas are run in the name of a registered trust or society. The trust or society can be started by some founder or saint, Non-governmental organizations/ self-help groups or village Panchayats. Each gaushala has an executive committee known as Gaushala committee.

The generalized structure of Gaushala management committee henceforth called as Gaushala committee is given in Fig. 3. Apart from executive committee, some gaushalas also have Manager and Supervisor. The committee is selected through mutual understanding for a term of 3 years. The members in a committee can vary from 5 (ad hoc committee) to 15. In some Gaushalas honorary members were also there but they only contribute when funds are required in emergency. The executive committee has the full responsibility of Gaushala which includes supervising, managing, maintaining records and funds and day to day functioning in the Gaushala. This executive committee is selected among the members of the Gaushala committee.

DOI 10.5455/ijlr.20190313065125

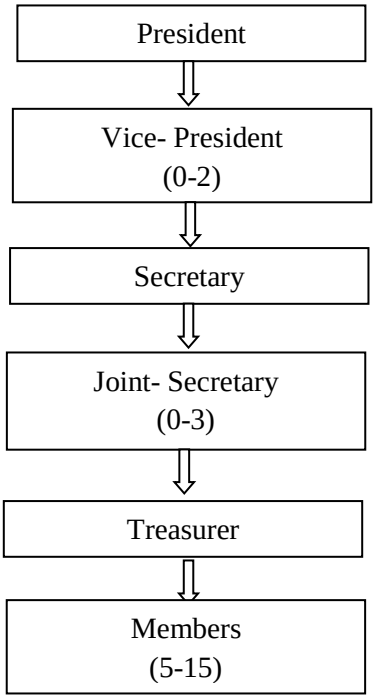

Fig. 3: Structure of Gaushala committee

Activities Performed by Gaushala

The Gaushalas have various kinds of activities. Their major activity is upkeep and welfare of stray and injured cattle, unproductive cattle left by villagers and animals saved by police from butchers etc., sale of pure milk, sale of various medicinal and products made from cow dung, cow urine and cow milk, sale of heifers, cow and service bulls, sale of grains and organization of trainings and several cultural activities. These cultural activities also help in generation of funds to the Gaushala.

Income and Expenses of Gaushala

The data on average annual income and expenditure of Gaushalas in the study area is compiled in Fig. 4 and 5 respectively which shows the percentage contribution of sources of income and expenditure. Donations have the largest share (75%) in total income of the Gaushalas. The various sources of donations found were *Gau Gras*, donation box, temple donation, donation in festivals and cultural activities, monthly member's contribution, donation for fodder and shed construction etc. Grants given by government contribute 7% to gross income. Apart from these fund sources, Gaushalas also sell some products such as milk, compost, cow dung and urine, *ark*, scrap sales, sale of cows, heifers, sale of grains etc. The miscellaneous income includes discount received, interest on deposits, cow awards etc. The income received from sales contributes 12% to gross income and miscellaneous income contributes almost 5% to gross income.

DOI 10.5455/ijlr.20190313065125

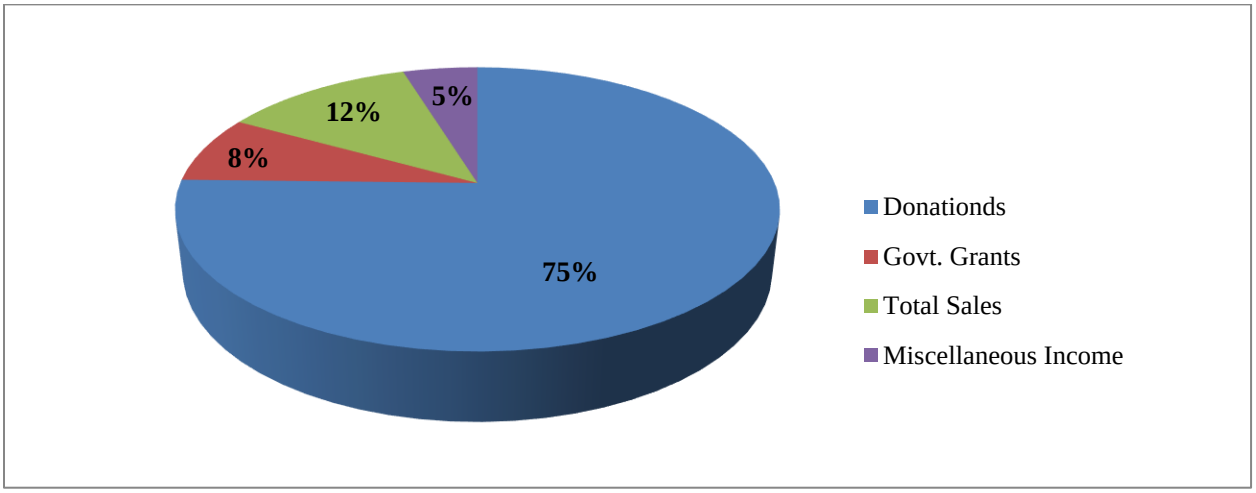

Fig. 4: % share of different sources in Gaushalas total income

In case of expenses, the major expenditure was on feed and fodder in the Gaushalas (50%) After feeding expenses, miscellaneous expenses were found as major operational expenses (11%) followed by labour expenses (10%). Miscellaneous expenses include expenses on repair and maintenance, office and stationary items, petrol and diesel, travelling, utility and other bills, kitchen, agricultural, cultural expenses and expenses on sundry items. The fixed expenses contribute 26% of total expenses which includes salaries given to employees (2.56%) and depreciation of inventory of Gaushalas (23.68%). The expenses do not include land as these are donated to Gaushalas. The inventory of the Gaushalas includes cattle sheds, stores for fodder, chaff cutters, office buildings, vehicles, machines and equipment's with the Gaushalas.

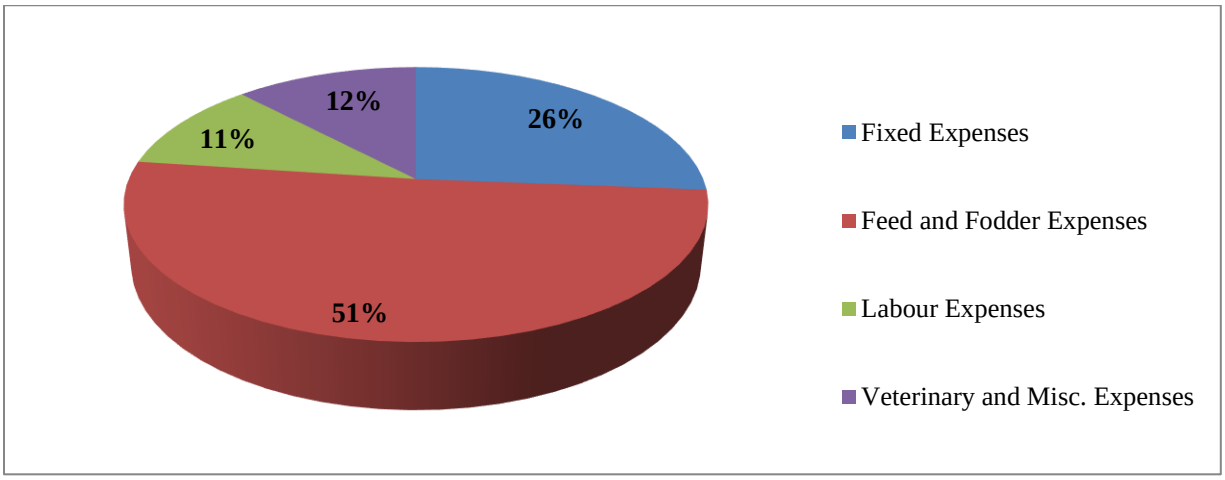

Fig. 5: Gaushalas expenses (Per cent share)

DOI 10.5455/ijlr.20190313065125

Income Diversification of Gaushalas

Income diversification was found to have close relation with economic sustainability. More diversified the activities of a Gaushala; higher will be its sustainability. The income diversification was computed using Herfindahl Diversification Index (H.D.I). Higher the H.D.I, higher will be the income diversification. The values of H.D.I for the Gaushalas presented in table 5.4 shows that the Kaithal (0.75), Panipat (0.57) and Karnal Gaushalas (0.49) were highly diversified Gaushalas. The reasons for their high diversification were less dependence on just one source of funds *i.e*. donations (51%), they were involved in selling milk, dung, medicines and other sales (scrap, cows, heifers, grains, cow awards, discounts, interest and land rent received etc.) which contribute 21%, 2%, 0.37% and 9% to the gross income respectively. On an average all these income sources contribute 47% to gross income of these highly diversified Gaushalas. The reason behind the diversification of these Gaushalas is increasing market demand for their products and better utilization of cow dung, urine and other usable wastes. Similar findings were reported by Toshniwal and Singh (2015) for Kanpur Gaushala, where use of bullocks and various products from cow dung and urine has helped in achieving sustainability. While in case of less diversified Gaushalas milk, dung, medicines and other sales (scrap, cows, heifers, grains etc.) contribute 2.5%, 1.2%, zero and 1.09% to gross income respectively. On an average all these income sources contribute 4.8% to gross income of these less diversified Gaushalas and they are mostly dependent on just one source of funds *i.e*. donations (95%). These Gaushalas were less diversified because they had less productive animals and low market demand for Gaushala products.

Table 4: Diversification indices constructed on the income of Gaushalas

S. No.	Districts/ Gaushala	H.H.I	H.D.I
1	Kaithal	0.25	0.75
2	Panipat	0.43	0.57
3	Karnal	0.51	0.49
4	Yamunanagar	0.52	0.48
5	Rohtak	0.65	0.35
6	Ambala	0.68	0.32
7	Hisar	0.69	0.31
8	Bhiwani	0.81	0.19
9	Jind	0.84	0.16
10	Kurukshetra	0.96	0.04

Economical Sustainability of Gaushalas

In the previous section, an attempt was made to know the share of various income sources in total funds generation of Gaushalas and also to know about the various expenditure parameters. The major share of income of Gaushala comes from public donations. This means the Gaushalas were much dependent on outside sources rather than self-sustenance. Therefore, it is very important to analyze the economic

 DOI 10.5455/ijlr.20190313065125

sustainability level of these Gaushalas, so that ways could be found out to raise the level of their sustainability.

Economic Indicators

In this section, the economic sustainability has been calculated using six economic indicators viz. net income per animal, returns over variable cost per animal, self-sufficiency/ autonomy, donations, proportion of productive cows and employment generation. All these indicators are weighted in overall Economical Sustainability Index (ESI) *i.e.* into an overall figure which shows the economic sustainability of the Gaushalas.

Net Income per Animal

The net income is worked out for each Gaushala. The same is presented in Table 5. The net income is negative for Bhiwani, Hisar, Jind and Rohtak Gaushala. It is because of the addition of fixed expenses in total expenses of the Gaushalas. It is lowest for Bhiwani (₹ -788 per animal per annum) and highest for Karnal (₹ 4258 per animal per annum) followed by Yamunanagar (₹ 2890 per animal per annum). Overall the net income is positive (₹ 9482.32 per animal per annum). It increased with decreasing number of animals.

Table 5: Economic indicators across Gaushalas

District	Net Income (Rs. /Animal)	Return over VC (Rs. / Animal)	Autonomy (% Sales)	Donations (% Donations)	Productive Cows (%)	Employment (hrs/day)
Ambala	19.82	4951.34	15.33	81.85	14.87	6.93
Bhiwani	-788.37	2084.79	7.12	90.03	7.97	7.8
Hisar	-437.6	1453.39	5.82	82.77	6.01	7.34
Jind	-179.16	2201.97	2.68	91.64	11.22	7.57
Kaithal	462.2	3310.21	39.47	29.2	12.12	7.16
Karnal	4258.96	9979.73	25.78	66.81	15.57	7.3
Kurukshetra	1148.34	4939.54	1.49	98.1	2.11	7.28
Panipat	2112.87	5487.54	27.25	60.18	19.64	5.53
Rohtak	-4.61	1358.37	6.54	79.44	10.01	7.3
Yamunanagar	2890.75	9837.47	31.19	66.07	13.6	7.67
Average	948.32	4560.44	16.27	74.61	11.31	7.19

Returns over Variable Cost per Animal

The returns over variable cost are positive in case of all Gaushalas which shows they are able to cover their operating expenses. As like net income, returns over variable cost are also higher for Karnal Gaushala (₹ 9979 per animal per annum). The returns are lowest for Rohtak gaushala (₹ 1358 per animal per annum). The overall returns over variable cost per animal are ₹ 4560.44 per annum.

DOI 10.5455/ijlr.20190313065125

Autonomy

The autonomy shows the income earned by Gaushalas through the sale of products made in Gaushala itself. As mentioned in previous section, it includes sale of milk, cow dung, compost, cow urine, medicines and other sales (phenyl sales, dead animal sales, cow and heifer sales, scrap sales, grain sales etc.). It shows the share of total sales revenue in gross income of Gaushalas. The percent share of sales revenue for the Gaushalas is presented in Table 5. The Kaithal gaushala is found to be most autonomous (39%) followed by Yamunanagar Gaushala (31%) and Kurukshetra Gaushala was least autonomous (1.5%). Kaithal Gaushala is involved in selling dung, milk, grains, scrap and dead animals, land, while Kurukshetra Gaushala is not selling any product. The overall autonomy is 16%.

Donations

Donations are also considered as an important determinant of economic sustainability which shows how much Gaushalas are dependent on outside sources to run the Gaushala. It has negative effect on sustainability. Higher the proportion of donations, lesser will be the ESI. It is presented in table 5. Kurukshetra Gaushala is the most dependent Gaushala (98%) followed by Jind gaushala (91%). The least dependent Gaushala is Kaithal Gaushala (29%). On the whole donations contributed 75% to the Gross income.

Proportion of Productive to Total Animals

The productive animals in the Gaushala are important determinant of its economic sustainability. For a Gaushala to be sustainable, besides maintaining unproductive and uneconomical animals, it should also have good number of productive animals in it. Only then it can be sustainable because sale of milk and sale of cows, heifers contributes around 20 to 30% of total income. The proportion of productive to total animals in each Gaushala is presented in Table 5 which shows that Panipat gaushala has the highest proportion of productive animals (20%) among total herd followed by Karnal Gaushala (16%). The Kurukshetra Gaushala has the lowest proportion of productive animals (2%).

Employment Generation

Gaushalas are a source of employment generation to the area where they are established. In most cases the labour is of permanent type, which was brought from other states like Bihar, Odisha etc. Table 5 depicts the employment generation in labour hours per day per person. The average working hours are 7.2 hours per day per person. Panipat gaushala had the highest man hours (447) followed by Rohtak (396) and Kaithal (382) Gaushalas. Yamunanagar Gaushala generated the least man hours (175) followed by Kurukshetra Gaushala (191). On an average the selected Gaushalas generated 342 man hours.

DOI 10.5455/ijlr.20190313065125

Weight Assignment and Classification of Gaushalas

The Economic Sustainability Index (ESI) has been estimated by taking into consideration all the above mentioned six indicators. Since each indicator does not have equal importance, therefore weights have been assigned to them with the help of expert opinion discussed earlier. The value of Economic Sustainability Indices for each Gaushala is presented in Table 6 which shows that the value of overall economic sustainability ranged from a low level of score (0.15) for Hisar Gaushala to a high sustainable level (0.80) for Karnal Gaushala. It is found that more than half of the Gaushalas fell in low sustainable category while only three Gaushalas were high in their economic sustainability level and only one district fell in medium sustainable.

Table 6: Relative economic sustainability status of Gaushalas

District/ Gaushala	ESI	Rank
Karnal	0.8	1
Yamunanagar	0.77	2
Panipat	0.57	3
Kaithal	0.51	4
Ambala	0.37	5
Kurukshetra	0.27	6
Jind	0.21	7
Rohtak	0.21	8
Bhiwani	0.18	9
Hisar	0.15	10
Overall	0.3	

In order to get a comprehensive differentiation between low and high sustainable Gaushalas, the following discussion is carried out according to the classification of Gaushalas in low and high sustainable groups (Chand and Sirohi, 2012).

Less Sustainable Gaushalas (ESI < 0.33)

The Gaushalas which fell in low sustainable category were Hisar, Bhiwani, Rohtak, Jind and Kurukshetra Gaushalas with 0.15, 0.18, 0.21, 0.21 and 0.27 Economic Sustainability Indices respectively. These Gaushalas on an average performed poor in all the economic indicators viz. net income per animal, returns over variable cost per animal, autonomy, donations, proportion of productive cows. They has very low average net income (₹ -207per animal), lower returns over variable cost (₹ 1134 per animal), less autonomy (5%), more dependency on donations (94%), less proportion of productive animals (4.2%) in total animals. Among all the low sustainable Gaushalas, Hisar, Bhiwani, Rohtak and Jind Gaushalas has negative net income and lower returns over variable cost. Though Kurukshetra gaushala has positive values for these

 DOI 10.5455/ijlr.20190313065125

indicators, but it is the least autonomous and most dependent Gaushala with lowest proportion of productive animals in total animals of the Gaushala.

Moderately Sustainable Gaushalas (0.33< ESI<0.66)

Panipat, Kaithal and Ambala Gaushalas are moderately sustainable with ESI values 0.57, 0.51 and 0.37 respectively. They have moderate net income (₹ 865per animal), returns over variable cost (₹ 4583 per animal), autonomy (27%), donations (62%) and proportion of productive to total animals (13%).

Highly Sustainable Gaushalas (ESI > 0.66)

The Gaushalas which fell in high sustainable category were Karnal (0.80) and Yamunanagar (0.77) Gaushalas. These Gaushalas on an average performed good in all the economic indicators viz. net income per animal, returns over variable cost per animal, autonomy, donations, proportion of productive cows. They have very high average net income (₹ 3771 per animal), higher returns over variable cost (₹ 9929 per animal), more autonomy (28%), less dependency on donations (58%), more proportion of productive animals (16%) in total animals as compared to low sustainable Gaushalas. Among all the highly sustainable Gaushalas, Karnal gaushala has the highest net income (₹ 4259 per animal) and returns over variable cost (₹ 9979 per animal), Yamunanagar gaushala has highest value of autonomy (31%), Karnal gaushala is having the highest proportion of productive animals (20%) in total animals of the Gaushala.

Conclusion

The gaushalas in eastern part comprising of Karnal and Yamunanagar were in top ranking with Economic Sustainability Indices values of 0.80 and 0.77 respectively. These highly sustainable Gaushalas has higher net income, returns over variable cost, high diversification indices and low operating ratios. Also, these sustainable Gaushalas has less number of animals as compared to other Gaushalas. Panipat, Kaithal and Ambala gaushalas are moderately sustainable with ESI values 0.57, 0.51 and 0.37 respectively. They has medium net income (₹ 865 per animal), returns over variable cost (₹ 4583 per animal), autonomy (27%), donations (62%) and proportion of productive to total animals (13%). Among these Kaithal gaushala has performed well in three indicators *viz*. autonomy (40%), donations (30%) and in proportion of productive total animals (12%).

On the other hand in the western part of the state, Hisar gaushala is the least sustainable Gaushala with very low ESI 0.15 followed by other Gaushalas in western part of the state *viz.* Jind, Bhiwani, Rohtak and Kurukshetra gaushalas with low ESIs 0.18, 0.21, 0.21 and 0.27 respectively. Among these less sustainable gaushalas, Hisar gaushala performed worst in case of net income, Rohtak gaushala had lowest returns over variable cost and Kurukshetra gaushala performed worst in three indicators *viz*. autonomy (1.5%), donations (98%) and proportion of productive animals (2%). These less sustainable Gaushalas also had lower

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diversification indices viz. 0.31, 0.19, 0.16 and 0.04 for Hisar, Bhiwani, Jind and Kurukshetra gaushala respectively. This shows that there was a positive relation between diversification and sustainability. The sustainability increases with increase in diversification. The average ESI was 0.30, much lower than the maximum obtainable value of 1.00, indicating that the overall sustainability status of gaushalas was low in the study area. The gaushalas in eastern part of the states were more sustainable as compared to gaushalas in western part which shows regional variation in the sustainability level in the state.

Suggestions

The findings of this investigation have several implications for the sustainable development of Gaushalas on the whole. These are given as follows-

1. At present, Gaushalas are new area of concern. Several Non-governmental organizations or trusts and several Self-Help groups are already working in this area. Their efforts can be supplemented with new governmental schemes.
2. Government has been found to be lagging in providing financial assistant to Gaushalas as it was found that meagre grants were provided to the Gaushalas and that too irregularly. The Government funding can be increased by allocating a certain portion of funds in the annual budget to the Gaushalas alone.
3. The net income was found negative for various Gaushalas due to higher expenditure on feeding of large number of animals and very low milk production. Hence efforts should be made to provide good quality of feed and fodder at reasonable prices which will help in lowering the expenses of the Gaushalas. It will help in raising the net income of the Gaushalas.
4. The Gaushalas maintaining lesser number of animals than other Gaushalas were categorized under highly sustainable Gaushalas which shows that for sustainability, manageable number of animals should be kept and maintained in Gaushalas. It was found less sustainable kept more number of animals against the prescribed capacity of Gaushalas.
5. The Gaushalas in western part of the state were less sustainable as compared to eastern part which shows that there was regional variation among Gaushalas regarding sustainability. Hence agro climatic or district level plan should be made for sustainable development at aggregate level and priority should be given to less sustainable areas. Hence, Economic Sustainability Index (ESI) helps the government to know the areas where much attention is required and thus prepare policies or projects or programs for that region.
6. The Gaushalas can strictly start charging some fees from those farmers who leave their animals in Gaushalas. Though some Gaushalas were found following it but the rules were not strict.A positive relation was found between income diversification and sustainability of the Gaushalas; hence Gaushalas should diversify their income sources. It can also be commercialized and taken as collective enterprise by making and selling various products like pesticides, insecticides, organic manures and several other products made from milk, cow dung and cow urine.
7. The Gaushalas' infrastructure should be built efficiently so as to accommodate adequate number of animals in Gaushalas. The Gaushalas must have adequate facilities such as veterinary hospitals, ambulance, processing facilities, oil mill etc. Even though in some Gaushalas dung was used to prepare manures and compost, still there is some scope of using it in biogas plants and in electricity generation. Cow urine, dead animals' skin, hoofs etc can be used to prepare various products or can be sold. These

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are some ways to diversify the income of the Gaushalas. Efforts should be done to increase the number of productive animals in the Gaushalas as milk was found as an important and basic constituent of income to the Gaushalas. Thus, sustainability can be increased by improving the milk yield of these animals with the help of new technologies, proper breeding practices, better feeding, proper veterinary care etc.

8. The less sustainable Gaushalas should learn lessons from high sustainable Gaushalas regarding the various activities done by the highly sustainable Gaushalas and low sustainable Gaushalas should follow them. Sustainable Gaushalas can contribute to a large extent in protecting indigenous cow and improve their welfare in the country. The Gaushalas can be run more efficiently by giving professional orientation to them. The Gaushalas can be also be integrated with each other and sell better quality products on commercial basis.

Learning Lessons for Less Sustainable Gaushalas

First lesson the less sustainable Gaushalas should learn from high sustainable Gaushala is the diversification of activities. The Gaushalas can be sustainable only if it undertakes various activities of product making and selling. It should not depend on donations alone. Gaushalas should undertake proper care of productive animals as they are the important source of income and had a strong and positive relation with sustainability. Though some less sustainable Gaushalas were preparing different products, but they were not marketing them. So proper market research should be done and Gaushalas should take such activities on commercial basis. The Gaushala labour should be provided requisite manpower training for processing of cow dung and urine.

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