
PRODUCTION AND PROMOTION OF ORGANIC AND BIO FERTILISERS WITH SPECIAL FOCUS ON IMPROVING ECONOMIC VIABILITY OF GAUSHALAS



The Task Force Report
March, 2023



NITI Aayog

**Production and Promotion of
Organic and Bio fertilisers with
Special Focus on Improving
Economic Viability of Gaushalas**

————— March, 2023 —————

Preface

The NITI Aayog received representations from Gaushalas, civil society, political representatives, and experts on cattle wealth of indigenous breeds, to suggest policy intervention and mechanisms for sustaining Gaushalas, creating market avenues for by product and waste of cattle, enable gaushalas to generate income, encourage use of various products made from cow urine and cow dung, integrate Gaushalas with healthy farming and create shelter for abandoned cattle. The Aayog also took cognisance of increasing number of stray cattle both in urban as well as rural areas which was becoming menace in many ways. Representatives of farming community also raised concern from time to time about the damage caused by the stray cattle to their crops and rising severity of the problem.

To address these concerns and issues a taskforce was constituted in NITI Aayog to take holistic view of the entire issue and to suggest measures to make gaushalas economically viable and to address problem of stray and abandoned cattle. The Taskforce comprise experts from Academia, Research Institutions, Representatives of the Union Government from the concern Ministries/Department, Representatives from Gaushalas, Farmers' Association and stakeholders/experts from related fields. The terms of references of the Taskforce were put on NITI Aayog's website to receive comments and suggestions from the public.

The Taskforce noted that cattle are integral component of the traditional farming system in India which sustained farming for centuries without external inputs. However, with the progress of green revolution and modern technology of agriculture, the traditional system of farming has been largely replaced by the system based on use of industrial inputs and agro chemicals. Of late, realization has been growing to reduce or replace agro chemicals, serving as plant nutrients and plant protection, for economic, health, environment and sustainability reasons. Accordingly, there is a trend towards natural farming and organic farming where inorganic fertilizer and agro chemicals are replaced by livestock manure, plant based products, bio inputs, and products made from cow urine and cow dung. The Taskforce felt that Gaushalas can be of great help in promoting natural farming and organic farming. Thus, complementarity can be built to promote Gaushalas and natural farming.

Taskforce members visited a few Gaushalas and interacted with their managements to understand the situation, operation, facilities, livestock upkeep, infrastructure and condition of Gaushalas. The Taskforce was taken to units manufacturing various products like PROM, Bio CNG, and products from cow urine and cow dung. Discussions were held with Gaushalas to understand the challenges faced by them in upkeep of animals and recycling of wastes. These visits provided very useful insights to develop recommendations for self-sustainable Gaushala models.

In order to understand and analyse costs and economic viability of gaushalas, NITI Aayog entrusted a research study to National Council of Applied Economic Research (NCAER), New



Delhi. The study covered an in-depth analysis of operating costs, the recovery of fixed costs, additional expenses and risks associated with gaushalas with operational Bio-CNG plant and PROM plant etc. The Taskforce used the parameters and findings from this analysis in preparing some of the Recommendations.

I thank all the members of the Task force for their valuable suggestions and inputs in preparing this report. Special thanks to Dr. Neelam Patel, Sr. Adviser Agriculture, NITI Aayog and Member Secretary of the Task Force, for her multiple contributions to accomplish the task assigned to the Taskforce. Dr. Patel arranged various meetings, visits of Taskforce members to gaushalas, and interactions with various stakeholders. She, alongwith her team consisting of Dr. Tanu Sethi, Senior Associate and A. G. Adeeth Cariappa, Young Professional in Agriculture Vertical, compiled material for the report and prepared the draft report. I acknowledge their contribution and thank them again.

It is our hope that the report will be useful in guiding interventions for improving financial and economic viability of Gaushalas and channelizing potential of stray, abandoned and uneconomic cattle wealth for promoting natural and sustainable farming.

Ramesh Chand

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Abbreviations

AIF	Agriculture Infrastructure Fund
AWBI	Animal Welfare Board of India
CAGR	Compound Annual Growth Rate
CBG	Compressed Bio Gas
CISS	Capital Investment Subsidy Scheme
CSE	Centre for Science and Environment
CSR	Corporate Social Responsibility
DAP	Di Ammonium Phosphate
DST	Department of Science and Technology
FCO	Fertiliser Control Order
FIAPO	Federation of Indian Animal Protection Organisations
GOBAR	Galvanising Organic Bio Agro Resource
ICAR	Indian Council for Agricultural Research
ICRIER	Indian Council for Research on International Economic Relations
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
KSB	Potassium Solubilizing Bacteria
MDA	Market Development Assistance
MNRE	Ministry of New and Renewable Energy
NBFC	Non-Banking Financial Corporations
NCONF	National Centre for Organic and Natural Farming
NDDB	National Dairy Development Board
PCA	Prevention of Cruelty to Animals
PCR	Polymerase Chain Reaction
PPP	Public Private Partnership
PROM	Phosphate Rich Organic Manure
PSB	Phosphate Solubilizing Bacteria
RCPR	Registration of Cattle Premises Rules
USP	Unique Selling Proposition
ZSB	Zinc Solubilizing Bacteria



1

Constitution of the Task Force

The finance minister in the Budget speech of 2020 announced that the Government “shall encourage balanced use of all kinds of fertilisers including the traditional organic and other innovative fertilisers.” This is a necessary step for improving fertiliser use efficiency, restoring and raising soil fertility and long-term sustainability of agriculture.

A slew of measures and support have been extended to agriculture over the years to raise income of the farmers and to promote sustainable agriculture for supply of adequate, safe and nutritious food to our population. Organic waste and biomass produced from crops and livestock present an opportunity to supplement farm incomes and ensure sustainable agriculture. Biomass, by-products and waste generated by livestock can be utilised to produce organic/bio fertilisers and bio-energy to reap large benefits. By-products of cow, like dung and urine, are known for several usages including Ayurveda medicines and other formulations since ancient times. Thus, channelizing livestock by products and waste has the potential to improve profitability of livestock, and can help to ease the burden on the state exchequer spent on subsidies and imports of inorganic fertilisers besides improving soil fertility.

NITI Aayog received several representations, from various Gaushalas and Institutions involved in the upkeep and maintenance of cattle, to suggest suitable mechanism for improving economic viability of Gaushalas by making productive use of by-products of cattle, capacity enhancement of Gaushalas and government policy support to run these Institutions.

Therefore, an initiative was taken by the NITI Aayog to examine and suggest the possibilities for effective utilization, production, processing, quality standards, infrastructure and marketing of products developed from cattle waste especially in Gaushalas and scope for income generation by Gaushalas. Accordingly, a task force was constituted by NITI Aayog vide OM no Q-11/2/2021-Agri under the chairmanship of Prof. Ramesh Chand, Member, NITI Aayog. The composition of the task force is as under:

Sl. No.	Name and Designation	Role
1.	Prof. Ramesh Chand, Member, NITI Aayog	Chairman
2.	Dr. Yogesh Suri, Senior Adviser, NITI Aayog	Member
3.	Smt. Rajni Taneja, Deputy Secretary (NRM), MoA&FW	Member
4.	Prof. Virendra Kumar Vijay, Professor, CRDT, IIT Delhi	Member
5.	Dr SK Dutta, Joint Commissioner (NLM), Ministry of Fisheries, Animal Husbandry and Dairying	Member
6.	Dr. Gagnesh Sharma, Director I/c, National Centre of Organic Farming	Member
7.	Shri Ujjwal Kumar, Deputy Secretary, Department of Fertilisers	Member



Sl. No.	Name and Designation	Role
8.	Shri Y. Baramatikar, Joint CEO, KVIC	Member
9.	Shri S.R Meena, Sci. D, Ministry of New and Renewable Energy	Member
10.	Shri Shankar Chaudhary, Chairman, Banas Dairy, Gujarat	Member
11.	Dr. Y.V. Singh, Principal Scientist, Div. of Microbiology, IARI	Member
12.	Shri Shashwat Asawa, Project Coordinator, Shri Mataji Gaushala, Barsana	Member
13	Shri Rakesh Mishra, Under Secretary, Ministry of Petroleum & Natural Gas	Member
14.	Shri Ken Raghvan, Social Worker, Goseva Gramvikas	Co-opted
15.	Shri Dinesh D Kulkarni, Organization Secretary, Bhartiya Kisan Sangh	Co-opted
16.	Prof. Makarand M. Ghangrekar, Dept. of Civil Engineering, IIT, Kharagpur	Co-opted
17.	Dr. Neelam Patel, Senior Adviser (Agri), NITI Aayog	Member Secretary

The Terms of Reference of the task force were:

- i. To assess the status of bio fertiliser production and consumption in the country and briefly present its implications.
- ii. To assess existing standards for bio fertilisers and organic fertilisers in the Organic Fertiliser Control Order of the Government of India and suggest changes to expand it.
- iii. To devise innovative ways and policy to promote cow economy¹ and use of cow manure as bio-fertiliser and bio-energy, especially produced by gaushalas, to convert cattle into economic assets.
- iv. To suggest the measures/policy initiatives for encouraging the commercial production, packaging, marketing & distribution of bio fertilisers including development of Brand/s and address difficulties in marketing & certification of bio fertilisers.
- v. To explore Public Private Partnership model with various stakeholders including gaushalas, Dairy cooperatives and Farmer Producer Organisations for production of enriched solid and liquid bio fertilisers.
- vi. To suggest mechanism and policy support for encouraging the commercial production, packaging, marketing, and distribution and use of bio fertilisers to create level playing field with inorganic fertilisers.

The task force also invited comments/suggestions/success stories from stakeholders related to the task. A webpage was created on NITI Website for the same in November 2021.

The Task Force held its meetings on 6th October 2021 and 9th June 2022.

¹ Cow dung and cattle dung are synonymous and interchangeably used in the report

2

Gaushalas of India: Overview and Background

According to the Bureau of Indian Standards a gaushala is a protective shelter, abode, or sanctuary for cows, set up to improve their health and life, sell pure milk and cow products, conserve germplasm, and stop animal cruelty (BIS, 1987). By offering care and shelter, these gaushalas perform the critical function of preventing the suffering of cattle. Gaushalas are also known by names like *pinjrapole*, *kanji house*, *gauvatika* etc., and are spread throughout the country.

The origin of gaushalas can be traced to the Vedic period, when the emphasis was on protection, preservation and development of cows (FIAPO, 2019). There were also social movements like the Gaurakshini Sabha (Cow Protection Society) of Punjab in 1882 which aimed at protecting the holy cow. This soon spread in the Northern part of India and eventually to the entire country. At present there are above 5000 gaushalas in India, out of which, 1837 are recognised under the Animal Welfare Board of India (AWBI) (FIAPO, 2019). AWBI is the statutory body of the 'Prevention of Cruelty to Animals Act' 1960 (PCA). Gaushalas receive financial support and management advice from the AWBI. Under the PCA 1960, Gaushalas fall under the purview of the Registration of Cattle Premises Rules (RCPR). Specifically, Gaushalas uphold the provisions of the PCA by helping avoid the unnecessary pain and suffering related to the slaughter and abandonment of cattle.

WHY ARE GAUSHALAS REQUIRED?

According to the 20th Livestock census, the total cattle population in India is around 19 crores (Figure 1), of which around 25% (4.7 crores) are male. These male cattle, when not used or usable for draught power, old and unproductive indigenous cows are the potential candidates for admission in Gaushalas. As dairying became increasingly intensified in the past three decades; since 1991-92, total milk production and per capita availability increased at an annual rate of 4.45% and 2.85% respectively². Total cattle population in the country increased by 0.8% during 2012-2019 while it decreased by about 4% during 2007-12³. The main reason for the decline was the replacement of male cattle by machinery for draught purpose and lack of interest in upkeep of cattle by the farmers once they pass their milking stage and turn uneconomical to feed (Bijla and Singh, 2019). Farmers often abandon such cattle and they either keep roaming or land in Gaushalas. In the 10 districts of Haryana, out of the total cattle housed in gaushalas, 89% were unproductive (Bijla and Singh, 2019). The disowned indigenous cattle can be seen moving freely in rural and urban areas, and on roadsides, often feeding

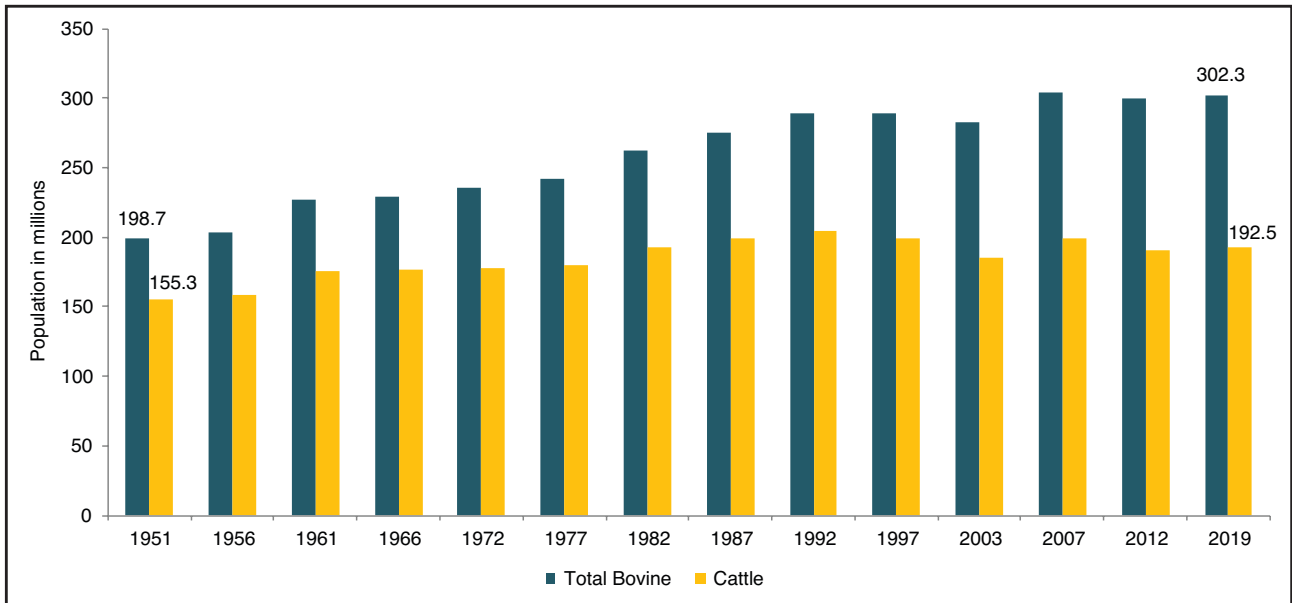
² <https://www.nddb.coop/information/stats/milkprodindia>

³ <https://www.nddb.coop/information/stats/pop>



in garbage dumps. Some of them end up at the slaughterhouses. The population of stray cattle in the country is estimated at 53 lakhs⁴. According to the Ministry of Road Transport & Highways, stray animals caused 1604 road accidents in India, with the highest being in Gujarat (220), followed by Jharkhand (214) and Haryana (211)⁵.

Many of the states in India have banned cattle exports making it even harder to manage the huge population of old, unproductive cows and male cattle. Farmer testimonies from Haryana suggest that the newborn male calves are also sent to gaushalas by some farmers (they pay gaushalas to house their male calves) or abandoned near mandis (markets).



Source: Livestock Census (various issues)

Figure 1: Population of bovines (cattle + buffaloes) and cattle in India 1951-2019

TYPES OF GAUSHALAS

Based on the management regimes, Gaushalas can be classified into four types (FIAPO, 2019):

- Government run gaushalas:** Many municipal bodies round up stray cattle, sick and injured animals and keep them till their owners claim them. They are released to their owners after imposing a small fine. More often, this does not happen and the ‘spent’ animals from dairies spend the rest of their lives in gaushalas. These Gaushalas house cows, male cattle, and in some cases also buffaloes. The local government bears the financial burden of these gaushalas. In some cases, the day-to-day operations of the gaushala are transferred to an external organization based on a tender system.
- Privately run gaushalas for animal rescue:** These gaushalas house rescued bovines (mainly cows, especially indigenous cows) transported for illegal slaughter. These gaushalas also host helpline numbers for rescue of injured animals. They house more

4 https://dahd.nic.in/sites/default/files/Livestock%20%205_0.pdf

5 https://morth.nic.in/sites/default/files/Road_Accidents_in_India_2016.pdf

animals than the space/ facility they have resulting in crowding, pressure on bedding area, grazing area, poor feeding, care and medicine.

3. **Privately run gaushalas for conservation of native breeds:** These are conservation centers for indigenous cattle. They follow progressive management practices, have sustainable infrastructure, grow nutritious fodder, and use cow dung, urine and panchgavya. These gaushalas only house limited animals based on their capacity. Few have turned into resource, information and capacity building centers for other gaushalas. These gaushalas train farmers on vermicomposting, biogas, bio fertiliser and organic fertiliser etc. As a result of the increased abandonment of unproductive dairy animals and stray cattle, these gaushalas are under continuous pressure from the local government and public to accept more animals.
4. **Gaushalas run by religious institutions:** These are run by religious institutions and accept abandoned and unproductive animals from farmers. The sale of milk is the main source of revenue for these gaushalas and therefore operates similar to dairy farms. Some of such gaushalas also prepare and sell products made be from cow dung and urine. Their traditional management practices resist change in the way animals are treated, and also in running gaushalas.

FUNDING OF GAUSHALAS

Major sources of income for gaushalas are donations by general public, business entities and a few corporates, government grants and the sale of milk. Some studies show that in Haryana, 74% of the income of gaushalas came from private donations, 7% from government grants and 20% from the sale of milk (Singh et al., 2021). In Telangana, 83% came from donations and 14% from selling milk and milk products (Sivaram et al., 2021). All over India, 81% of the gaushalas were running as private bodies with no support from the state and funding were mainly received for adoption of animals, fodder, medicines, infrastructure and expansion of gaushalas (FIAPO, 2019). Major expenses of gaushalas were towards feed and fodder followed by veterinary and medical expenses (Bijla & Singh, 2019; Singh et al., 2021; Sivaram et al., 2021).

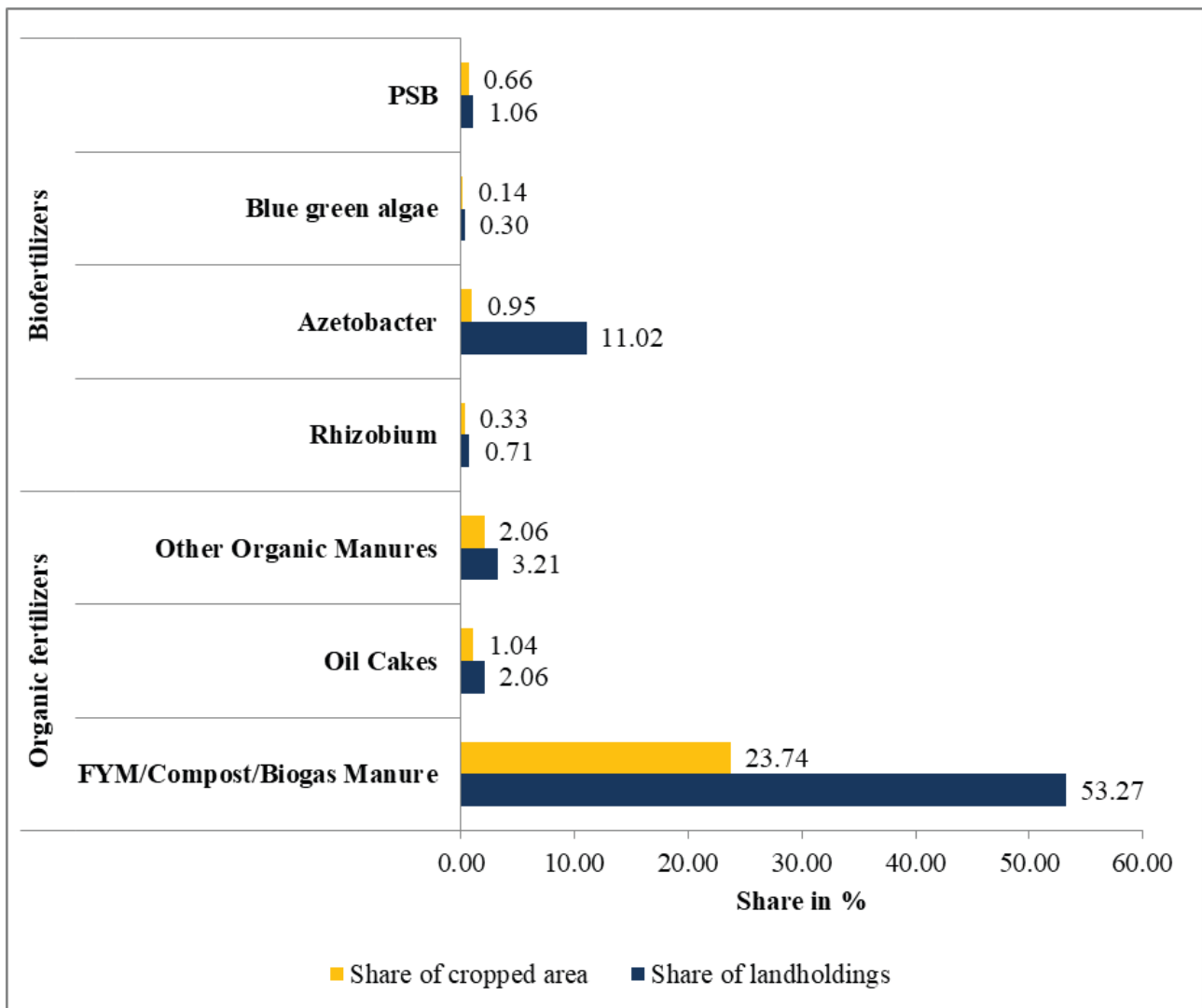
Are they profitable? Are they financially sustainable?

Most of the gaushalas in India depend heavily on donations and there is a need for internal income generation to be financially sustainable in the long run. Evidences from different studies suggest that some of the gaushalas are profitable or financially viable in the short run (revenues cover only the working expenses) but are vulnerable in the long run. For instance, operating expenses constituted 70% of the incomes of Gaushalas in Haryana, while total expenses accounted for 97% of their income (Bijla & Singh, 2019). Out of the 14 gaushalas studied in Telangana, 12 gaushalas had negative net incomes and 4 could not even meet the operating expenses (Sivaram et al., 2021). A study on the long term sustainability of gaushalas observed that sustainability is directly associated with diversification of its sources of income (Sivaram et al., 2021). This means, if the gaushalas have multiple sources of income, it is highly likely that they will cover all the costs and become even profitable in the long run.



Options to make Gaushalas Economically Viable

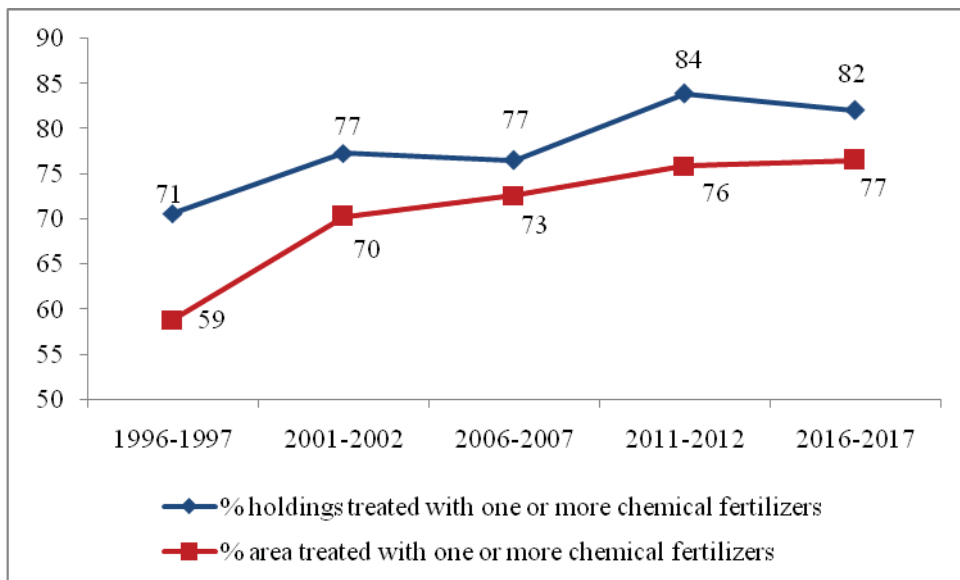
For the long-term financial sustainability of gaushalas, there is a need to find alternative business models for them. In an investigative report, the Federation of Indian Animal Protection Organisations (FIAPO) offers different revenue models with expected costs and benefits. These include manufacturing and sale of organic fertilisers such as manure/compost, fuel/biogas and bio fertilisers by the gaushalas and being the input suppliers for bio pesticide/bio fertiliser, paper and pharmaceutical industries (FIAPO, 2019). Also, (Yadav and Vij, 2010) argue that the Gaushalas can be turned into active cattle improvement and conservation centres through in-situ conservation of indigenous breeds and progeny testing of large number of bulls. The use of organic fertilisers and bio fertilisers is quite low in India. Less than 1% of the cropped area is treated with any bio fertiliser and less than a quarter of the cropped area is treated with organic fertilisers (Figure 2). There is huge potential for manufacturing and selling organic and bio fertilisers in the country. This will reduce huge burden of subsidy being given on inorganic fertilisers.



Source: Input Survey, 2016-17

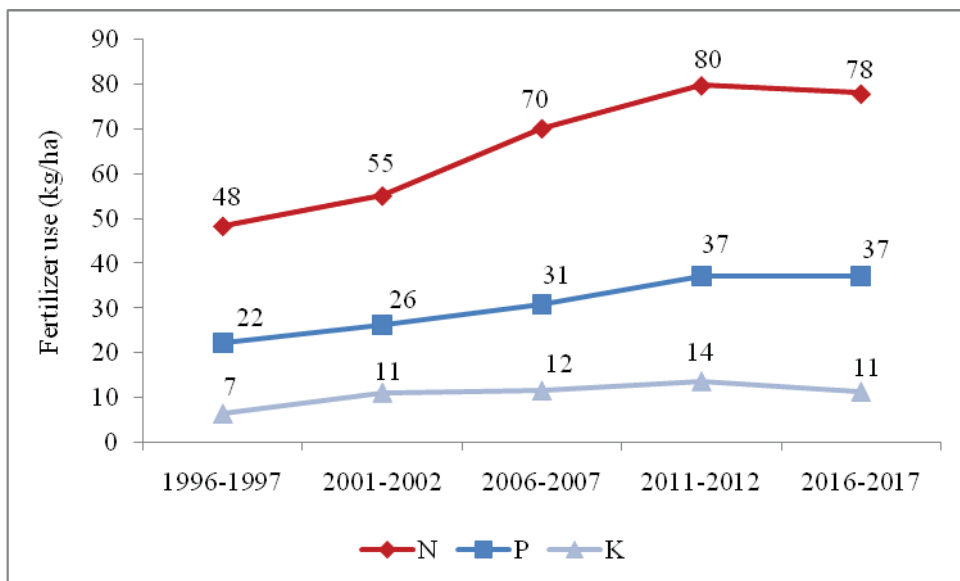
Figure 2: Percent of farmers and area covered with use of organic and bio fertilisers in India

Gaushalas can become major supplier of inputs for promoting natural farming in the country through concerted efforts of the government, private players and entrepreneurs. Natural farming, as a chemical-free farming system, is being promoted to check adverse effect of agro chemicals on human health, reverse the environmental ill effects (like soil degradation, ground water depletion, loss of biodiversity etc.) caused primarily because of overuse of chemical fertilisers and pesticides after onset of green revolution in India (see Figures 3 and 4 which depicts increased use of chemical fertilisers in India).



Source: Input Survey, 1996-97 to 2016-17 (<https://inputsurvey.dacnet.nic.in/>)

Figure 3: Share of agricultural holdings and cropped area that are treated with one or more chemical fertilizers



Source: Input Survey, 1996-97 to 2016-17 (<https://inputsurvey.dacnet.nic.in/>)

Figure 4: Nutrient use per hectare of cropped area (1996-97 to 2016-17)



Natural farming is already being practiced in 11 states on 6.5 lakh hectares⁶. Livestock, specifically indigenous cattle and buffaloes, are an integral part of natural farming. Natural inputs like Beejamrit and Jivamrit; natural insecticides like Neemastra, Brahmastra, Agniastra and Dashaparni are produced from cow dung or cow urine or both⁷. With proper information and trainings, a new input segment along the line of “Natural Inputs” can be developed through preparation, packing, branding and distribution across India. This untapped potential of gaushalas could be an opportunity for meeting nutritional requirement of crops and for protection against pests and diseases. Some gaushalas are already in the business of producing other innovative products like agarbattis, idols, and paints using cow dung and urine which could also earn some revenue for the gaushalas.

Beside low or lack of income, gaushalas also face many more challenges like inadequate space to house animals, poor veterinary facilities, low availability of feed and fodder, high incidence of reproductive disorders in cows, labour shortage for livestock upkeep and shrinking grazing lands. Some of these will be taken care of by default if the gaushalas become financially sound but most of these challenges require institutional support. The challenges and the financial sustainability of gaushalas are not mutually exclusive. Thus, sustaining gaushalas requires financial and other support from the governments at the Centre and States, corporate players, general public and other stakeholders.

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6 <https://naturalfarming.niti.gov.in/components/>

7 <https://naturalfarming.niti.gov.in/components/>

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3

Status of Organic and Bio fertiliser Production in the country

Organic and bio fertilisers are promising agriculture inputs. In the backdrop of 'Atma Nirbhar Bharat', it is envisaged to bring 14-million-hectare land (i.e., approx. 10% of total area under cultivation) under organic farming till year 2025⁸.

BACKGROUND

India is the second highest producer and consumer of chemical fertilisers in the world. Per hectare fertiliser consumption in the country has increased by 75 percent during the last two decades and reached a level of 161 kg per hectare of gross cropped area in the year 2020-21. More than half of the chemical fertilisers consumed in India are in the form of urea. As the cost of chemical fertilisers is continuously rising, the total subsidy on chemical fertilisers is steeply growing every year. In 2020-21, the annual subsidy bill was ₹1,31,230 crores, which is more than 10 times the subsidy bill of ₹12,908 crores in 2001-2002. The subsidy bill has grown sharply since 2019-20, due to rising international prices of imported fertiliser and raw materials required for manufacturing fertilisers etc.

The increasing use of chemical fertilisers has affected the environment. According to the United Nations-backed Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the nutrient run-off from farms laced with synthetic fertiliser has adversely affected land ecosystems. Also, the ammonia emissions from agricultural activities can combine with pollution from vehicle exhausts to create dangerous particulates in the air and exacerbate respiratory diseases. Fertiliser use also constitute significant share in greenhouse gases emitted in crop production. Promoting organic and bio fertilisers and replacing chemical fertilisers with them is an eco-friendly intervention that will reduce environmental pollution and has a scope to reduce the cost of cultivation.

Over the years, the Government of India has taken up many initiatives to increase the farmers' income and supply safe and nutritious food through sustainable agriculture. The schemes such as Paramparagat Krishi Vikas Yojana, Mission Organic Value Chain Development for North Eastern Region, etc., are initiated to promote application of organic fertilisers.

Effective utilisation of livestock by-products offers great opportunity for sustainable agriculture as, dung and urine are eco-friendly source of plant nutrition to enrich & restore soil nutrients, conserve the micro-fauna of soil and act as a natural surface purifier. Dung manure contains basic elements critical to plant health i.e., nitrogen (N), phosphorus (P), and potassium (K) and several micro nutrients. Also, humus in dung manure act as a soil amender and preserves

⁸ <https://aioi.org.in/centre-targets-14-million-hectares-of-land-under-organic-farming/#::-:text=HYDERABAD%3A%20The%20centre%20is%20planning,that%20presently%20area%20under%20organic>



moisture in the soil. In 1970-71, dung manure accounted for about 43 percent of the total value of manure and fertilisers used in agriculture. This declined drastically to 23 percent in 1980-81 and to about 13 percent during the 1990s⁹.

STATUS OF ORGANIC AND BIO FERTILISERS IN INDIA

In India, organic fertilisers and biofertilisers are regulated by the Fertiliser (Inorganic, Organic or Mixed) (Control) Order (FCO), 1985, under the Union Ministry of Agriculture and Farmers' Welfare. Beside chemical fertilisers, 11 biofertilisers and 10 organic fertilisers are also approved under FCO for use in India as of now.

The current area under organic farming in the country is estimated to reach 38.09 lakh hectares which includes 6.19 lakh hectares under Paramparagat Krishi Vikas Yojana (PKVY), 1.23 lakh hectares under Namami Gange Programme, 4.09 lakh hectares under BPKP (Natural Farming), and 26.57 lakh hectares under National Program for Organic Production (NPOP) (MoA&FW, PIB release 2021)¹⁰. The Government of India has a target to bring additional about 10 lakh hectares area under organic farming in the next 3 years that will require the usage of bio fertilisers and other organic inputs.

ORGANIC FERTILISERS: PRODUCTION

Organic fertilisers are substances made up of one or more unprocessed material(s) of a biological nature (plant/animal) and may include unprocessed mineral materials that have been altered through microbiological decomposition process" (Fertilisers Control Order, 1985). Organic fertilisers are composted/fermented products made from organic wastes (city waste, agro waste, crop residue, livestock waste, food processing industry waste etc.). Organic fertilisers specified under FCO, 1985, is classified in following categories:

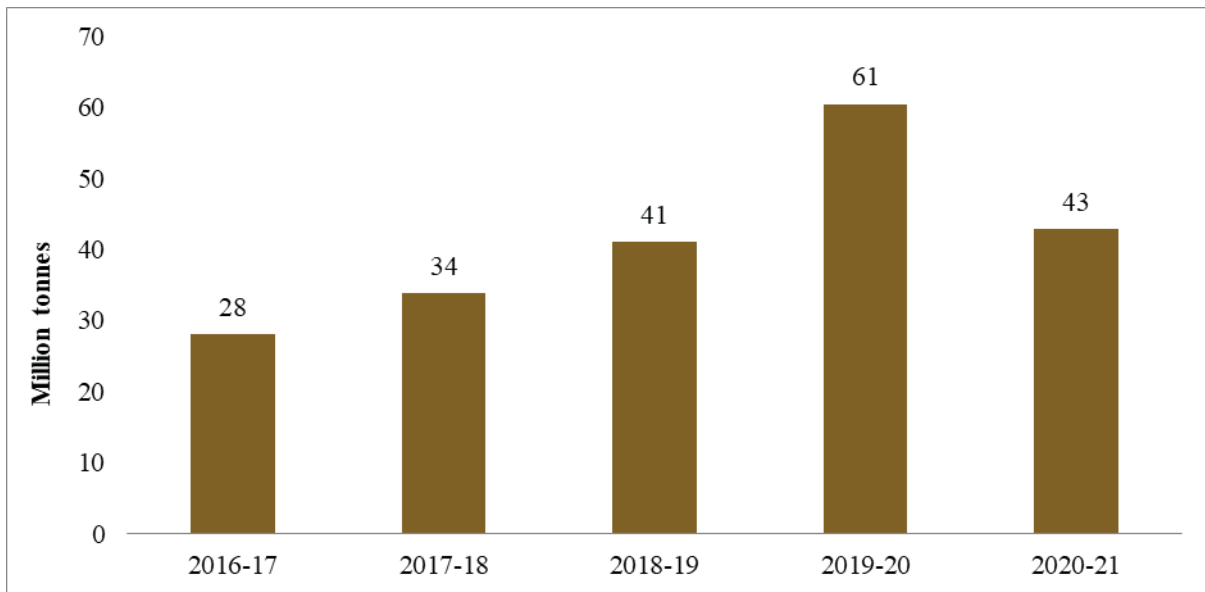
- i. City Compost,
- ii. Vermi compost,
- iii. Phosphate Rich Organic Manure (PROM),
- iv. Organic Manure,
- v. Bio-enriched Organic Manure,
- vi. Bone meal (raw/ steamed),
- vii. Potash derived from Rhodophytes,
- viii. Fermented Organic Manure and
- ix. Liquid Fermented organic manure.

Realizing the need and rising preference of consumers for organic produce there is a lot of emphasis on replacing use of chemical fertilisers with organic and biofertilisers. Production of

9 <https://www.icrisat.org/PDF/Economiccontributionoflivestocksubsector.pdf>

10 <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1778909>

organic fertiliser increased from 28 million metric tonnes in year 2016-17 to 61 million tonnes in year 2019-20 (Figure 5). The list of major categories treated as organic fertiliser is presented in Figure 6.



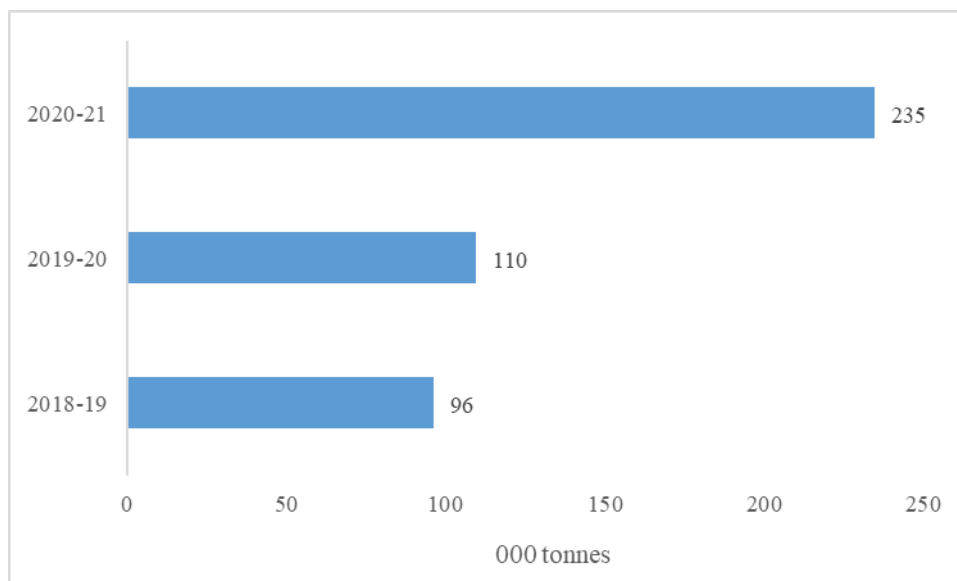
Source: MoA&FW and CSE 2022 report on status of bio fertiliser and organic fertiliser

Figure 5: Production of Organic Fertilisers

BIOFERTILISERS: PRODUCTION

It is important to point out that Bio fertilisers are different than organic fertilisers. Bio fertilisers are defined as the product containing carrier-based (solid or liquid) living microorganisms which are agriculturally useful in terms of nitrogen fixation, phosphorus solubilisation or nutrient mobilization, to increase the productivity of the soil and/or crop (FCO, 1985). Upon application to seed and/or soil, these microbial preparations multiply rapidly around emerging crop roots and fix/mobilize nutrients from air and soil, from unavailable form to available form. Also, the nutrient solubilizers (as P, K or Zn solubilizers) transform insoluble nutrients present in soil to soluble form for easy uptake by crop plants. The average dose of mixed bio fertiliser application is 6 lit/ha for liquid formulations and 12 kg/ha for solid carrier-based, for fixation/ solubilisation of 20-25 kg nutrients/ha (chemical fertiliser application equivalent).

At present, in India, the market for bio fertilisers is around ₹1200 crores which is likely to rise to around ₹2,000 crores in the coming few years due to growing awareness and demand. During 2019-20, India produced 79,446 metric tonnes of solid carrier-based biofertilisers and 30,106 KL of liquid biofertilisers from a total of 537 biofertilisers production units (371 solid carrier based biofertilisers units and 166 liquid biofertilisers units) spread across the country. During 2018-19 and 2020-21, biofertilisers (liquid base and carrier base) production has increased from 96 million metric tonnes to 235 million metric tonnes (Figure 6).



Source: MoA&FW and CSE 2022 report on status of biofertiliser and organic fertiliser (in 000 tonnes)

Figure 6: Production of Biofertiliser

Biofertilisers (solid/liquid/lyophilised) are available in four different forms viz. Nitrogen fixers (*Rhizobium*, *Azotobacter*, *Azospirillum*, *Gluconacetobacter species*), P-solubilisers (Wide range of bacteria, fungi and *Mycorrhiza*), K-solubilisers (*Bacillus mucilaginosus*, *B. edaphicus* and *B. circulanscan*, *Fratureiaaurentia* etc) and Zinc solubilisers and other micronutrient solubilisers (various bacteria).

Market Assistance for Organic/Biofertilisers

The subsidy schemes to support biofertiliser and organic fertiliser manufacturers and laboratory infrastructure include the Capital Investment Subsidy Scheme (CISS), the Soil Health Management Scheme, the Policy on Promotion of City Compost, and the New National Biogas and Organic Manure Programme (NNBOMP). A small sum of ₹18.9 crore has been released in the last 17 years for compost and biofertiliser production units under CISS. Only ₹8.67 crore has been released for biofertiliser units and biofertiliser and organic fertiliser testing laboratories under the Soil Health Management Scheme between 2014-15 and 2018-19. Market development assistance of ₹85.8 crore has been provided for city compost since 2016-17 to January 2021.

Challenges

- Absence of level-playing field for manufacturers of biofertilisers and organic fertilisers as well as for farmers willing to use non-chemical fertiliser options because of the heavy subsidies on chemical fertilisers.
- Limited Research and Development in the field of organic and bio fertilisers.
- Lack of regional resource centres for supply of authentic and efficient microbial strains and lack of awareness on part of biofertiliser units for proper preservation, sub-culturing, storage, procurement of authentic strains suitable for the local environmental conditions.

- Lack of availability of options for enriched organic fertilisers with essential nutrients for agricultural use.
- Lack of advancement in the testing equipment and testing protocols.
- Limited quality testing facility and trained personnel.
- Absence of economically viable mass production systems, which could lower the selling cost of the biofertilisers.
- Inadequate funds spent on the promotion of biofertilisers and organic fertilisers. Total funds spent remain small despite being allocated as part of multiple schemes (PKVY, MOVCNDR, NFSM, NMOOP, RKVY *etc.*) aimed at farmers.
- Lack of suitable infrastructure. Infrastructure support funds provided under schemes like “Capital Investment Subsidy scheme” and “Soil Health Management” have not seen much uptake in states and remained underutilised. Also, market development assistance for promoting city compost has been discontinued, which can severely limit the uptake of municipal solid organic waste as a source for organic manure.
- Lack of extension and awareness on the use and benefits of organic and biofertilisers amongst the farming community.

Production of Organic/Bio fertiliser in Gaushalas

As indicated in Chapter 1, gaushalas produce large scale cow dung and cow urine which is source of organic and bio fertiliser. The Gaushalas offer vast potential for production of organic and bio fertiliser, including bio-pesticides. Two important measures for initiating the product development at a scalable level are:

1. Selection of gaushalas: State-wise selection of gaushalas should be taken up preferably by the State Government for the production of organic fertiliser and biofertilisers including bio-pesticides.
2. Competence assessment: Competence assessment of gaushalas, which could take up production of bio fertilisers.

There should be a systematic process of approval/certification for gaushalas interested in manufacturing of organic/bio fertilisers.

- a. Gaushala selection: Gaushalas will have to certify their livestock and to be supported initially by certification agencies with special concession. This needs some modifications in PGS (Participatory Guarantee Systems (PGS) for India programme)/NPOP (National Programme for Organic Production) standards. The sourcing of fodder, feed and medicines need to be from organic source only.
- b. Quality of Organic fertilisers: The quality standards for biofertilisers and organic fertilisers are defined under FCO 1985. The manufacturers are required to adhere to

the standards and limits mentioned in the fertiliser control order and the product should be duly tested by certified testing facilities.

Future Prospects

During the last 10 years, organic and bio-input sectors have grown rapidly and are growing at 10-15 percent CAGR. Although, farmers are well aware about the benefits of bio and organic fertilisers, they are not using large amounts of bio and organic fertilisers because of the additional cost and relatively cheaper availability of chemical fertilisers.

The provision of Marketing Development Assistance (MDA) can boost the organic and biofertiliser sector and help facilitate the availability of bio and organic fertilisers at affordable prices.

Some reforms that can encourage fertilizers manufacturers are as follows:

- Digitization of the whole process of manufacturing, licence to sale authorization to dealer, Memorandum of Intimation as well as stock records and maintenance, timely sampling by inspector *etc.* as per FCO with time bound consultation with the States.
- Development and deployment of Bio/Organic Fertilisers Information Management and Tracking System.
- Improvement of efficiency of different formulations of organic and bio fertiliser.
- Sensitisation and capacity enhancement of fertiliser inspectors and analysts in the area of organic and Bio fertilisers.
- NABL accreditation of quality testing laboratories for organic and bio fertilisers.
- Sampling intensity in number and time should conform to statistical requirements.
- Adequate infrastructure and quality testing facilities for manufacturing Organic/Bio fertiliser. PPP mode testing facilities can be established as common facilities for a group of biofertiliser and organic fertiliser units.
- Issuance of license/renewal of license for production of biofertiliser/organic fertilisers units is to be based on proper monitoring of licensee firms for compliance of requisite equipment, plant and machinery, manpower, in-house quality testing facility, quality of the final products as per FCO, 1985.
- Testing/analysis of biofertiliser microbes (upto strain/variant level) and their efficiency character using/application of molecular biological tools like polymerase chain reaction (PCR)-coupled approaches, enzymatic complex detection approaches *etc.* for increasing the credibility of quality testing laboratories. ICAR and DST Institutes to be utilised.
- Upgradation of the quality testing laboratories with molecular biology analysis facilities (equipments, chemicals *etc.*).
- Amendment of FCO, 1985 specifications and guidelines in line with above points and to encourage production and commercialization of latest formulations.

- Use the existing public extension network (Krishi Vigyan Kendras, Pashu Vigyan Kendras, etc.) and modern digital extension tools to increase farmers' awareness regarding organic and bio fertilisers to increase the demand for bio and organic fertilisers.
- Revamping of Capital Investment Subsidy Scheme (CISS). NCOF have submitted proposal of revamped Capital Investment Subsidy Scheme (CISS). Revamping of CISS Scheme through NABARD will help in up gradation of biofertiliser production units, establishment of Fruit vegetable/ Animal waste/ Stubble composting unit and Gaushalas composting units including micro-level village enterprises. It is estimated that this proposal will increase the production of organic and bio fertilisers through establishment of around 100 organic input units during the next 05 years.
- Encouraging production of organic manure (slurry) through use of agro-biomass waste for production of CBG through the method of anaerobic digestion as recently started by a paddy stubble processing plant in Punjab by Verbio Ag-a biofuel company based in Germany.



4

Production & Promotion of Organic Fertiliser with special focus on Improving Economic Viability of Gaushalas

INTRODUCTION

According to the 20th livestock census, the total bovine population in India is around 30 crores out of which around 64% are cattle. One cow on an average produces 5-6 litres of urine and 10-12 kilograms of dung. Approximately 150-180 crore litres of cow urine and 3 million tonnes of cow dung are produced daily in the country. Very small proportion of this is utilised. Proper utilization of cow dung and cow urine into manure, pesticides, medicines and other daily products can generate employment for millions of people and help protect the soils from use of agro-chemicals. The waste produced in gaushalas (cow dung and urine) can be a very good source for manufacturing inputs for organic and natural farming.

Increasing awareness about ill effects of chemicals and pesticides all over the world indicates that people prefer buying organic food products, and in future, higher prices of agricultural produce can be earned with organically produced materials. While input cost is less in organic farming, the produce fetches higher price.

Gaushalas, in particular cows, were set up throughout India to provide shelter, feed and care to abandoned cattle. Many gaushalas serve their purpose well; some have grown in size and diversified and have become institutions in their own right. The management committees of some gaushalas render services selflessly and the local communities support them. But of late, the number of stray and abandoned cattle has risen to a level which is beyond the space and resources available with existing Gaushalas for their upkeep and sustenance. The central and state governments are now strengthening the existing gaushalas and helping set up many more. Most gaushalas depend on voluntary donations (charity) while some gaushalas also receive financial support from state governments in some states. These resources are not sufficient for proper care and feeding of cows in gaushalas. Second, gaushalas are not able to provide shelter and sustenance to all abandoned cattle in the country whose number is rising.

URGENCY OF DEALING WITH ABANDONED CATTLE

As already mentioned the number of abandoned cattle is increasing with each passing day. These abandoned cattle are turning out to be a big menace in both urban as well as rural areas in particular for agriculture sector. They cause lot of damage to crops resulting in huge loss to producer farmers. In many areas farmers are incurring huge cost in terms of putting fences around their fields to prevent entry of unwanted animals. In other cases, crops have



to be constantly guarded from such animals through constant watch and ward during day and night. In some areas farmers are shifting to crops which are not grazed by animals. There are also reports of farmers keeping their fields fallow rather than risking their crops to be damaged by abandoned animals, invariably cattle.

Gaushalas are the shelters for abandoned cattle but their capacity is not adequate to keep vast and growing number of abandoned cattle. Second, financial means of Gaushalas are highly inadequate and they need to generate funds from their resources like cow dung, cow urine, milk etc. that are regular and dependable. Gaushalas are also constrained by the low availability of feed and fodder, high cost of concentrates, insufficient and erratic government grants, high incidence of reproductive disorders of cows, and lack of space. However, if gaushalas are equipped to generate their own resources, then most of them can be self-sustainable beside being employment generating entities.

Below are some of the value-added products which are manufactured and marketed by a few gaushalas, though at a very low scale.

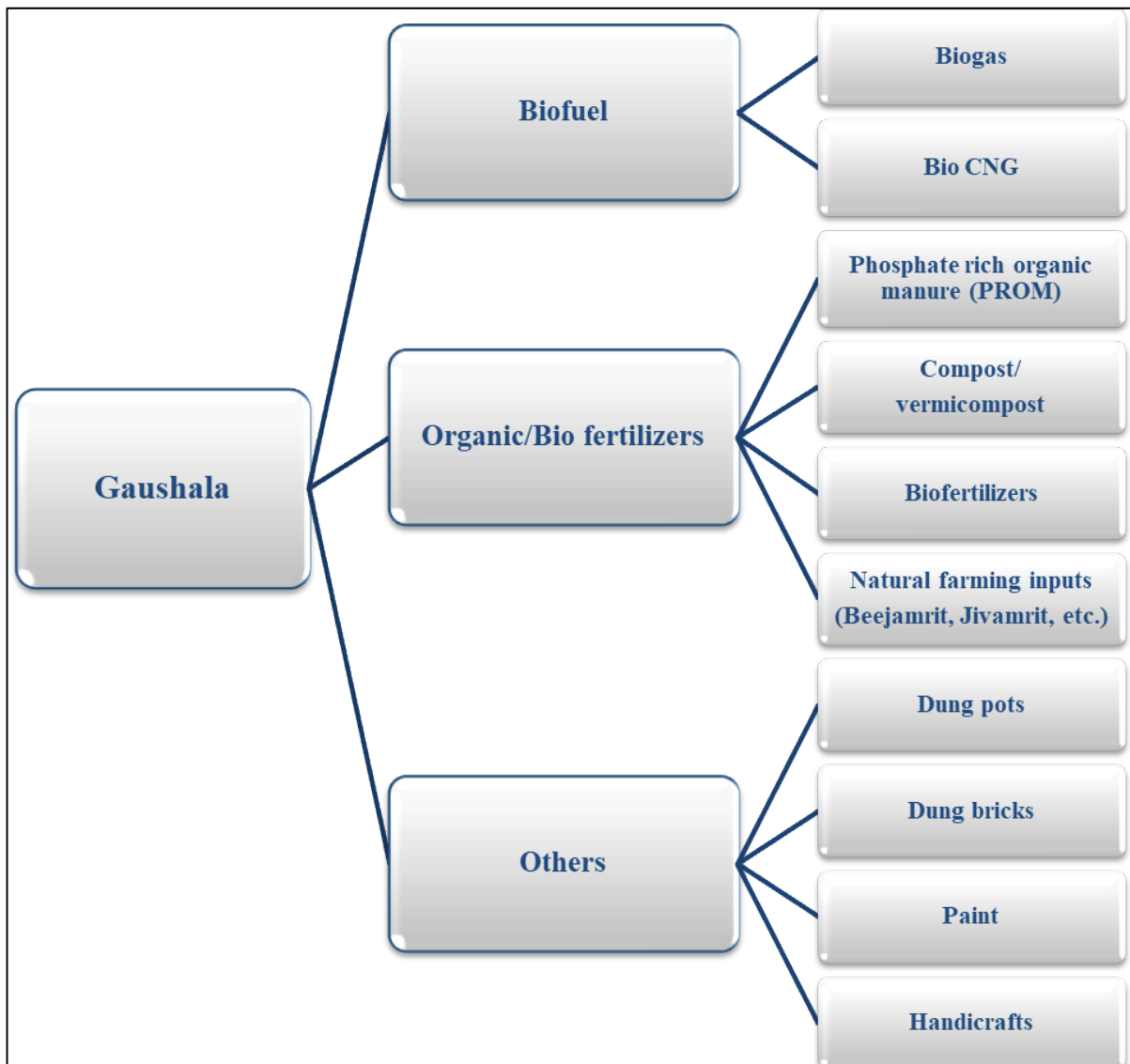


Figure 7: Different products for value addition in gaushalas

Gaushalas produce a large amount of cow dung. The best-known use of cow dung is preparation/ production of organic manure/ compost for soil nutrition. Some gaushalas use cow dung to produce biogas along with enriched compost, vermicompost, organic paints, and decorative items like lamps (diya), etc. There are also reports of use of cowdung for making environment friendly bricks and briquettes used as fuel. Such non-agricultural uses though commercially more attractive divert the use of cowdung from its use as manure to maintain soil fertility which is very crucial for sustainable agri-food production. Some Gaushalas are producing Phosphate Rich Organic Manure (PROM) from cow dung/ biogas slurry. PROM production technology (cold processing method) is available in India, and some enterprises already produce granular PROM. PROM production unit(s) may be established near the Gaushalas to reduce the transportation cost of cow dung to the PROM production unit (s) and generate employment. PROM can be a part of 'Atmanirbhar Bharat' since it can effectively replace chemical fertilisers like di-ammonium phosphate (DAP) which is mostly imported in India and a huge amount of subsidy is given on DAP fertilisers. Similar subsidy need to be extended for production/ marketing of PROM.

MANAGEMENT, COSTS AND MAINTENANCE OF GAUSHALAS

Proper housing is a vital feature in animal rearing. In addition to good breeding, feeding, and disease control, it helps in raising the production capabilities of animals (Bureau of Indian Standards, 1987). Good housing is important for the good health and comfort of animals. It also protects animals from inclement weather.

According to the Animal Sciences Division of the Indian Council of Agricultural Research (ICAR), the land required for gaushalas and fodder cultivation for different sizes is given in Table 1 and Technical and Supportive manpower requirement is indicated in Table 2.

Table 1: Land required for gaushala and fodder cultivation according to the herd size

No. of animals to be housed in gaushala	Land required for gaushala	Land required for fodder cultivation
100 cows	1.00 acre	15 acres
500 cows	4.50 acres	75 acres
1000 cows	7.50 acres	150 acres

Source: ICAR (2016)

Detailed layout of gaushala premises like floor space for animals, feeding and watering space, fence-line feed barriers, handling yard, veterinary dispensary, storage, office, quarters, etc. are available with Bureau of Indian Standards (1987) and ICAR (2016).

Table 2: Technical and supportive manpower required

Name of staff position	Number of positions required at different sizes of gaushalas		
	100 cows	500 cows	1000 cows
Gaushala Manager-cum-Veterinary officer	-	1	1
Veterinary stock assistants-cum supervisors	1	2	3
Technicians for mechanical, plumbing and electrical works etc.	-	1	2
Office clerk-cum-farm record Keeper	1	1	2
Unskilled workers	8	30	50
Drivers	1	1	2

Source: (ICAR, 2016)

COSTS INVOLVED IN GAUSHALAS

Feed and fodder expenses had the highest share in total costs. It was around 51% in Haryana and 82% of total cost in Telangana. The average number of animals housed in 10 gaushalas of Haryana was 2,236 (Bijla and Singh, 2019) and 705 in 14 gaushalas of Telangana (Sivaram et al., 2021). According to the standards mentioned above, the minimum area of a gaushala for these many animals is around 15 acres in Haryana and 6 acres in Telangana. However, the actual area under gaushalas of Haryana was 8.15 acres (46% lesser than recommended) and the average area under fodder was 9.42 acres (*i.e.*, about 4% of recommended). Expenditure incurred under various heads in 10 Gaushalas in Haryana is reported in Table 3.

Table 3: Expenditure incurred under different heads in 10 Gaushalas of Haryana

Cost head	Expenditure (lakh/year)/Gaushala
Total fixed cost	61.75
Green fodder	60.91
Dry fodder	38.19
Concentrates	20.53
Labour costs	25.32
Veterinary expenses	2.43
Miscellaneous	26.03
Total variable costs	173.45
Total costs	235.21

Source: (Bijla and Singh, 2019)

A more worrying factor is that the gaushalas in India do not have their own source of income. Donations accounted for 75 percent and 82 percent of the total income in Haryana and Telangana, respectively (Bijla & Singh, 2019; Sivaram et al., 2021). A study based on sample of 179 gaushalas across 15 states and union territories, found that 73 percent of the gaushalas solicited support from individuals, and 50 percent did not have a sustainable revenue model (FIAPO, 2019). There is a need to look for other sources of income like using cow dung and urine for the gaushalas. Cost and returns from some of such products are detailed in Table 4.

Table 4: Yearly cost and income from different products of a gaushala with 100 cows

(in Rs.)

Product	Fixed Cost	Maintenance cost	Income	Net income
Compost manure	1500	2400	36,000	33,600
Fuel and biogas (15-20 cubic meter capacity)	5,00,000	50,000	4,38,000	-1,12,000 (net profit from 2 nd year)
Organic Pesticide from cow urine	750	38,760	2,40,000	2,00,490
Cow urine for medicinal purposes		5,700	21,600	15,900
Cow urine for floor cleaners	19,000	36,000	1,80,000	1,25,000

Source: Adapted from (FIAPO, 2019)

The maintenance costs can be covered to some extent by using roof tops of cowshed for solar power, production of biogas for kitchen, Bio-CNG for vehicles, slurry and organic fertiliser to replace chemical fertilisers. Thus, if the gaushalas are properly supported by the government or the private sector or in PPP mode, the investors can be benefited and the gaushalas can turn Atmanirbhar entities.

CASE STUDIES

The Taskforce visited some Gaushalas and conducted three case studies to get more and first-hand information about the activities, expenditure and income of Gaushalas.

Case Study 1: Kamdhenu Gaushala Seva Sadan, Haryana

The Kamdhenu Gaushala Seva Sadan Pinjore, Panchkula Dist. Haryana was set up in the year 2006. It is managed by a society named “Kamdhenu Gaushala Seva Sadan Pinjore”. The gaushala is spread over 6 acres of land and houses about 1100 cattle. Prior to August 2021, the major sources of income were the sale of desi-cow milk/ghee, donations from trust members/general public and donation in kind of fodder/infrastructure from philanthropic donors. The sources of income and costs incurred after August 2021 are displayed in (Table 5). The gaushala produced and marketed six value added products made from cow dung and cow urine and earned a total of ₹10,70,800 during August-November, 2021.

**Table 5: Production, manufacturing costs, selling price and revenue from different products (Aug. 2021 to Nov. 2021)**

Sl. No	Product	Production, manufacturing costs and selling price	Revenue (in Rs.)
1.	Natural Disinfectant/ Phenyl	<ul style="list-style-type: none"> Approx. 4000 litres of Gautattva Phenyl sold to various buyers Manufacturing cost Rs. 25/- per Litre Selling price Rs. 37.5/- per Litre 	50000
2.	PROM/ Bio Manure/ Organic manure	<ul style="list-style-type: none"> 316 PROM bags of 50 Kg each Manufacturing cost Rs. 550/- per bag (excluding transportation/ dealer/ commission etc.) Selling price Rs. 900/- per bag 	110600
3.	Cow Dung Gamla	<ul style="list-style-type: none"> 2000 cow dung pots (<i>gamlas</i>) of various sizes Manufacturing cost Rs. 5 (small size), Rs. 6 (medium size) and Rs. 7 (large size) Selling price Rs. 10 (small size), Rs. 15 (medium size) and Rs. 20 (large size) Sold about 200 Nos. cow dung gamla along with Tulsi sapling to various devotees. Input cost Rs. 10 and selling price Rs. 101 Order is pending for 10,000 gamlas from the Forest Department 	18000 20200 90000
4.	Gobar Bricks	<ul style="list-style-type: none"> Sold about 500 Nos. cow dung bricks to various devotees. Input cost Rs. 10 and selling price Rs. 101 	45500
5.	Khadi Prakritik Paint	<ul style="list-style-type: none"> Sold about 400 Litre cow dung prakritik paint. Input cost Rs. 50/Litre Selling price Rs. 110/Litre 	24000
6.	Panchgavya Products (Diya, Dhoop, Aggarbatti, Soap, Hand-wash, Shampoo etc.	<p>Diyas:</p> <ul style="list-style-type: none"> Qty. manufactured approx. 80000 diya Input cost Rs. 1.50/Diya Selling price Rs. 6.50/Diya 	400000
		<p>Dhoop:</p> <ul style="list-style-type: none"> Qty. manufactured approx. 3600 Dhoop Pkt. Input cost Rs. 15/Pkt. Selling price Rs. 50/Pkt. 	126000
		<p>Aggarbatti:</p> <ul style="list-style-type: none"> Qty. manufactured approx. 500 Dhoop Pkt. Input Cost Rs. 15/Pkt. Selling Price Rs. 50/Pkt. 	17500

Sl. No	Product	Production, manufacturing costs and selling price	Revenue (in Rs.)
		Soap: <ul style="list-style-type: none"> Qty. manufactured approx. 2400 soaps. Input cost Rs. 15/soap. Selling price Rs. 50/soap. 	84000
		Hand-wash: <ul style="list-style-type: none"> Qty. manufactured approx. 1000 Hand-wash. Input cost Rs. 25/Hand-wash box. Selling price Rs. 60/Hand-wash box. 	35000
		Shampoo: <ul style="list-style-type: none"> Qty. manufactured approx. Hand-wash bottle. Input cost Rs. 30/bottle. Selling price Rs. 80/bottle. 	50000
Total earning during the period Aug 2021 to Nov 2021			10,70,800

Case Study 2: Shri Mataji Gaushala, Uttar Pradesh

Shri Mataji Gaushala, Barsana, District Mathura, Uttar Pradesh shelters over 50,000 cows, mostly abandoned male cattle. They run a successful pilot project on production of cow dung based organic compost fertiliser (200 tons a day capacity). They have appropriate machinery, testing labs, qualified volunteers who run the operation and manufacture products conforming to the Fertiliser Control Order. They run a bio-gas Turbine using the bio-gas produced as a by-product in the organic fertiliser plant. The electricity thus produced is fed to the Grid. The Bio-Gas Plant & Turbine etc. were supported through the Ministry of New and Renewable Energy (MNRE). The activities of the Shri Mataji Gaushala at Barsana include:

1. Production of A2 Milk
2. Indigenous cow breed improvement
3. Ayurvedic Hospital/ Pharmacy (Panchgavya based)
4. Cattle feed management & storage, etc.

The main constraint they face is the marketing of organic fertiliser produced in their compost plant.

Case study 3: Shri Vraj Kamad Surabhi Van Avam Shodh Sansthan, Rajasthan (also known as Shri Jhadkhor Gaudham)

Shri Jhadkhor Gaudham, along with other associated gaushalas running under same supervision provides shelters to over 10,000 Indian breed cows, including thousands of mostly abandoned male cattle. Shri Jhadkhor Gaudham has an organic fertiliser plant capable of producing 100 MT per day of Phosphate Rich Organic Manure (PROM). PROM produced by co-composting high



grade rock phosphate of very fine size with cow dung based organic fertiliser is an efficient way of adding phosphorous to soil as an alternative to chemical fertilisers (Sekhar et al., 2008). The gaudham also has a plant to manufacture cow urine based disinfectant. Unfortunately, the PROM manufacturing plant is in disuse due to lack of funds for marketing and also due to lack of mass awareness among the users regarding this alternative product. The disinfectant plant is also not being used due to lack of funds for marketing and relevant purchase orders. The buyer they had tied up with has backed out. As a result, the accumulated debt burden on the gaushala is about ₹ 4.5 crores. The gaushala has requested for considering a policy framework through which pasturing/grazing rights could be allotted to their cattle in the adjoining forest lands in the Aravalis. Shri Jadkhor Gaudham is also successfully carrying out work on conservation, protection and improvements in top notch breed of indigenous cows and bulls viz Gir, Sahiwal, Tharparkar, Rathi, Kankrej, Haryanvi etc. It has also a running small biogas plant, a small dairy unit producing A2 cow milk and a small Ayurvedic Medicine manufacturing centre primarily manufacturing medicines and products based on panchgavya. The gaudham has applied to the forest department and Rajasthan State Government for relevant permission and therefore requested for considering a policy framework through which pasturing/grazing rights could be allotted to their cattle in the adjoining forest lands in the Aravalis Compressed biogas (CBG)/biogas business models

Biogas and Bio-CNG produced from cattle dung can be an important source of income for Gaushalas. Table 6 displays biogas/CBG models run by dairy cooperatives, National Dairy Development Board (NDDB), private companies, gaushalas, gram panchayat and state government departments. It can be observed that the plants go to great lengths to source feedstock for their biogas plants. Banaskantha Bio-CNG plant in Gujarat, managed by the dairy cooperative union of the district, collects cow dung from 254 households owning more than 5 bovines each from 12 villages. They use a mobile application (App) to record the quantity of cow dung collected every day. The cooperative pays ₹1/kg of cow dung. In the cluster model of NDDB, 368 women dairy farmers having 2-3 cattle are provided with flexi biogas plants of 2 cum. Bharat Biogas Energy Ltd. CBG plant in Gujarat collects cow dung from around 700 families across 400 villages. They pay farmers ₹0.75-1.0 / kg of cow dung. Similarly, the community biogas plant in Hisar collects cow dung from farmers of Nayagaon village and pays 10 paise per kg of cattle dung. Only two plants collect cow dung from gaushalas which is an easy place to pick up cow dung in large quantities.

The biogas generated from the feedstock is used for different purposes in various forms. The purified gas is used in 100 vehicles through a gas station by the Banaskantha plant; biogas supplied through a network of overhead pipes is used by the households for cooking purposes in Anand and Hisar; purified methane/CBG is supplied to an Ayurveda factory in Haridwar; and Bio CNG is supplied to AMUL Dairy in Gujarat. The slurry from the plant is either sold directly to farmers in bulk quantities or converted into various products. For instance, the slurry is directly sold to farmers at ₹1000-1500/tanker. The solid part of the slurry is converted to vermicompost and PROM by adding rock phosphate, biofertilisers, and biopesticides and sold to farmers. The liquid part is reused for treatment.

Table 6: CBG/biogas business models

Name	Capacity of plant	Feedstock capacity	Type and source of feedstock	Costs	Source of funding
Banaskantha BioCNG plant, Gujarat	800 kg/day	40 tons/day	Type: Cow dung and potato waste Source: 254 households across 12 villages	₹ 8 crores (excluding land cost)	Banaskantha District Co-operative Milk Producers' Union Ltd
Zakariyapura cluster model, Anand Gujarat, A pilot project by NDDDB Biogas	2000 kg/day		Type: Cow dung and biodegradable waste Source: 368 women dairy farmers	₹ 1.23 crores	National Dairy Development Board (NDDDB)
Bharat Biogas Energy Limited, Umreth, Gujarat (CBG)	5400 kg/day	140 ton/day	Type: Cow dung, press mud, potato waste and water hyacinth Source: 700 households, sugar mill, wafers' plant and pond	₹ 21 crores (excluding land Cost)	Central Financial Assistance of 2.32 Cr under MNRE and Self-financing
Haridwar BioCNG project, Uttarakhand	400 kg/day	20 ton/day	Type: Cow dung Source: Gaushalas	₹ 3.0 crores (excluding land cost)	CSR-ONGC and Self-financing
Community Biogas plant Hisar, Haryana	320 kg/day	8 ton/day	Type: Cow dung Source: farmers of Nayagaon village	₹ 75 Lakh	Swachh Bharat Mission (Grameen) Gram Panchayat Fund, MGNREGA, MPLAD Fund and State Govt. Fund
CBG project at Varanasi, Uttar Pradesh	2500 kg/day	90 ton / day	Type: cattle dung, press mud and municipal solid waste Source: Gaushalas and sugar industries	₹ 22 crores	CSR Fund

Source: Adapted from SBM (https://sbm.gov.in/gbdw20/images/Fund/Different_models_of_CBGBiogasPlants.pdf)



SOLAR ROOFTOPS IN GAUSHALAS AND SOLAR TREES IN FODDER FARMS

Prime Minister of India, Sh. Narendra Modi has set a target of producing 100 GW of solar power by 2022 and desires India to be a frontrunner in the International Solar Alliance for clean energy. Large businesses in collaboration with state governments are working on it. Another feasible alternative is harnessing solar power in gaushalas and the associated fodder farms. Cost structure and returns from installing rooftop solar panels in gaushalas and solar trees in fodder farms is presented below. It is based on the assumption that solar panels will be installed on 50% of rooftop area, used for sheltering 100 cows on one Acre land.

Gujarat: Average solar irradiation in Gujarat state is 1266.52 W/sq.m. 1 kWp solar rooftop plant will generate on an average over the year 5.0 kWh of electricity per day (considering 5.5 sunshine hours).

Haryana: Average solar irradiation in Haryana state is 1156.39 W / sq.m. 1 kWp solar rooftop plant will generate on an average over the year 4.6 kWh of electricity per day (considering 5.5 sunshine hours).

Table 7: Cost and returns of installing solar rooftops in gaushalas under Social Sector customer category

	Gujarat	Haryana
Size of Power Plant	202.3 kW	202.3 kW
Cost of the Plant without subsidy @ MNRE current Benchmark Cost (without GST) of ₹ 35,886 / kW	₹ 72,59,738	₹ 72,59,738
Total Electricity Generation from Solar Plant		
Annual	3,03,450 kWh	2,79,174 kWh
Life-Time (25 years)	75,86,250 kWh	69,79,350 kWh
Financial savings		
Tariff @ Rs.8/ kWh (for top slab of traffic)-No increase assumed over 25 years		
Monthly	₹ 2,02,300	₹ 1,86,116
Annually	₹ 24,27,600	₹ 22,33,392
Life-Time (25 years)	₹ 6,06,90,000	₹ 5,58,34,800
Break-even point (year at which returns cover all the costs)	3 years	4 years
Lifetime net profits	₹ 5,34,30,262	₹ 4,85,75,062
Carbon dioxide emissions mitigated	6,221 tonnes	5,723 tonnes
This installation will be equivalent to planting	9,953 Teak trees over the life time	9,157 Teak trees over the life time

Source: Calculations taken from the National Portal for Solar Rooftop (Grid-Connected Rooftop), Ministry of New and Renewable Energy (https://solarrooftop.gov.in/rooftop_calculator)

The maximum size of power plant that can be installed in 1 acre of gaushala for 100 animals (assuming 50% of the area – 0.5 acre—is fitted with rooftop solar panels) is 202.3 kW. Cost of the Plant without subsidy at the MNRE current Benchmark Cost (without GST) of ₹ 35,886 / kW are around ₹ 73 lakhs. The annual financial saving would be equal to around ₹ 24 lakhs and ₹ 22 lakhs respectively in Gujarat and Haryana respectively. The respective break-even point at this rate of annual returns (assuming none of the electricity generated is consumed) is 3 and 4 years in Gujarat and Haryana. The lifetime (25 years) earnings would be around ₹ 6 crores. In India, as discussed before, the gaushalas are overcrowded and the land requirement is huge (both for gaushalas and fodder cultivation). If the gaushalas get more land through government or by themselves, the huge area under these gaushalas opens up the possibility of earning through grid connected rooftop solar panels. Along with the financial benefits, this mitigates carbon dioxide emissions of around 6,000 tonnes reducing the carbon footprint of gaushalas.

Solar trees in fodder farms

A study conducted by Indian Council for Research on International Economic Relations (ICRIER) based on global survey of solar trees found that it is being practised in countries like Japan, China and Germany (Gulati et al., 2016). The Delhi government in 2018 announced *Mukhyamantri Kisan Aay Badhotri Yojana* which aimed at increasing farmers' income by setting up solar trees in their agriculture land¹¹. Estimation is that, 500 solar trees can be installed in one acre of land at the height of about 10-12 feet (which ensures enough sunlight for the crops) such that even tractors can move around. Under the scheme, the farmers would be paid ₹ 1 lakh per acre a year, it would increase by 6% annually. Once allowed, the farmer has to assure that the agricultural land put under solar trees will not be converted to other uses for 25 years. Also, the farmers would get 1,000 units of energy each year per acre of land they rent out.

Similar model of solar trees can be adopted by the gaushalas. 15 acres of land is required for fodder cultivation to sufficiently feed 100 animals (Table 1). According to Delhi government estimates, 6 acres of land is required to set up a 1 MW solar plant, which will generate over 1.2 million units of electricity annually. The gaushalas can think of setting up at least one plant, which will also be a continuous source of income.

Challenges for setting up alternative business models along with rooftop solar panels and solar trees

1. **Land:** The gaushalas are overcrowded and they own very less area for fodder cultivation. Thus, there is a pressing need to make more land available to gaushalas. Government land or any uncultivated waste land or hills not suitable for cultivation or any grazing lands could be some options apart from purchasing new land.
2. **Labour:** Maintaining hundreds of animals, preparation of vermicompost/manure/bio fertilisers and other models are extremely labour intensive. There is a huge requirement of both unskilled and skilled labour (like veterinarians) in gaushalas. Training needs

¹¹ <https://www.hindustantimes.com/cities/delhi-news/delhi-govt-gets-farmers-consent-to-set-up-solar-power-plant-in-9-villages-101611173588188.html>

of these workers could be taken care by KVKs/PVKs or National Skill Development Corporation (NSDC).

3. **Capital:** All the product groups suggested to generate income for Gaushalas like biofuels, biofertilisers, solar panels and solar trees require huge upfront capital investment. Large businesses or CSR funding or any form of PPP or low interest EMIs are some of the options apart from government funding for all these business models.
4. **Management:** To maintain and oversee the various business models suggested in the document, a skilled manager and a few staff to maintain books and other requirements are necessary. Either the owners of the gaushalas should be well equipped to manage the day to day operations and accounts, or a manager should be hired for the same (like paid advisers from private sector).

The case studies, CBG models and discussions with various gaushalas highlight that they can become economically viable by using their waste (cow dung and urine) efficiently. Two major problems are identified from the case studies and discussions with various stakeholders. Those are initial capital investment and marketing of the products manufactured by gaushalas. The initial big push in the form of capital investment is required to make gaushalas profitable and self-sustainable. Any funding agency, the government, the banks, the NBFCs, the private limited companies or any start-ups must look at the gaushalas as a business opportunity which has the potential to grow in coming years. The returns on investment will be high if the gaushalas are managed professionally under any business/revenue models. The gaushalas can also cut down their operating costs by adding solar rooftop panels, which is also an investment opportunity for the government or the private sector. In terms of marketing the products, the government can use Khadi counters to sell the products like floor cleaners using their unique selling proposition (USP) which contain non-carcinogenic properties unlike those available in the market. The gaushalas could also be linked with FPOs/FPCs to produce and market organic fertilisers. The private players also could use their expertise in branding and marketing for increasing the revenues for themselves and the gaushalas.

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14. United States patent No. 6,410,059 Khanuja, et al. dated June 25, 2002 “Pharmaceutical composition contains cow urine distillate and antibiotics.”

APPENDIX

Appendix 1 Floor space requirements of cattle based on body weights (FAO standards)

Animal category	Age (months)	Weight (kg)	Area per animal (m ²)	
			Fully covered shed	Exercise yard
Young stock	1.5-3	70-100	1.5	1.4
Young stock	3-6	100-175	2.0	1.8
Young stock	6-12	175-250	2.5	2.1
Young stock	12-18	250-350	3.0	2.3
Bred heifers and small milking cows		400-500	3.5	2.5
Milking cows		500-600	4.0	3.0
Large milking cows		>600	5.0	3.5

Source: Adapted from (ICAR, 2016)

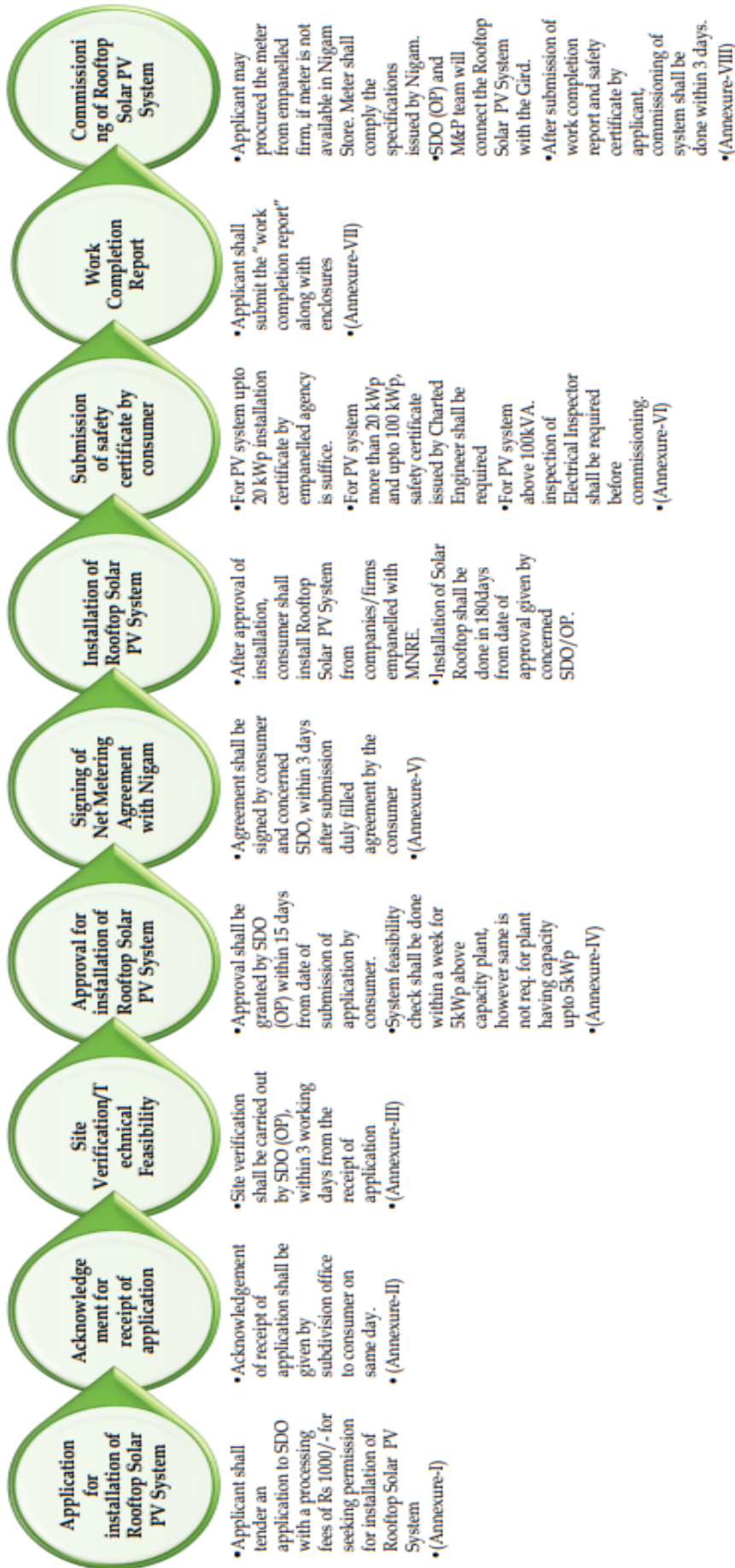


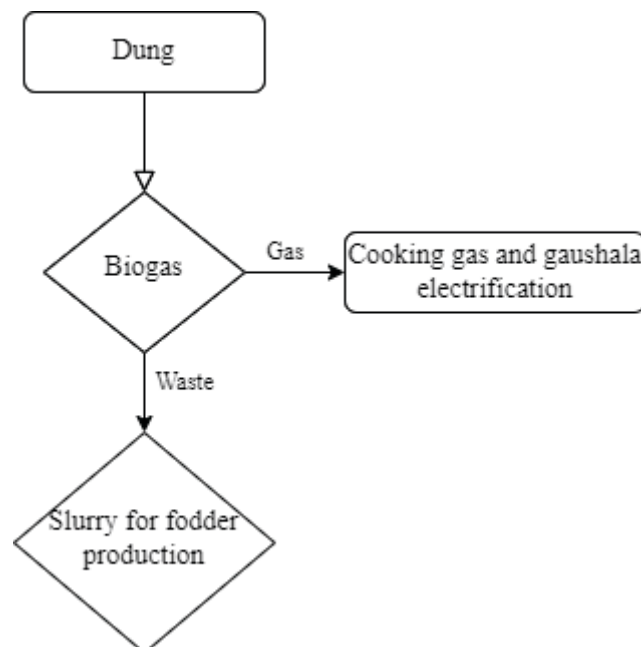
Figure 8: Flowchart for installation of Rooftop solar PV system in Haryana

5

Public Private Partnership Models for Gaushalas

Previous chapter discussed the possibility of making gaushalas economically viable by adopting various economic activities like manufacturing organic and bio fertilisers, biogas/bio-CNG, natural farming inputs, etc. The major requirement for achieving economic viability is the huge capital investment required to set up biogas/bio-CNG plant and procuring raw materials like rock phosphate among others. This chapter suggests some public-private partnership (PPP) models to bring in the initial capital investment to gaushalas. Public sector would need to play facilitating role in creating the entrepreneurial ecosystem for gaushalas through forming policies/incentives and reasonable support for setting up the required infrastructure and for the private players to invest in gaushalas. On the other hand, private companies are expected to invest in the gaushalas and share the profits with the gaushalas, preferably under a written contract. Following are some of the models through which the public and private sectors can come together to achieve the said objectives.

Model II: Medium (100-500 bovines)

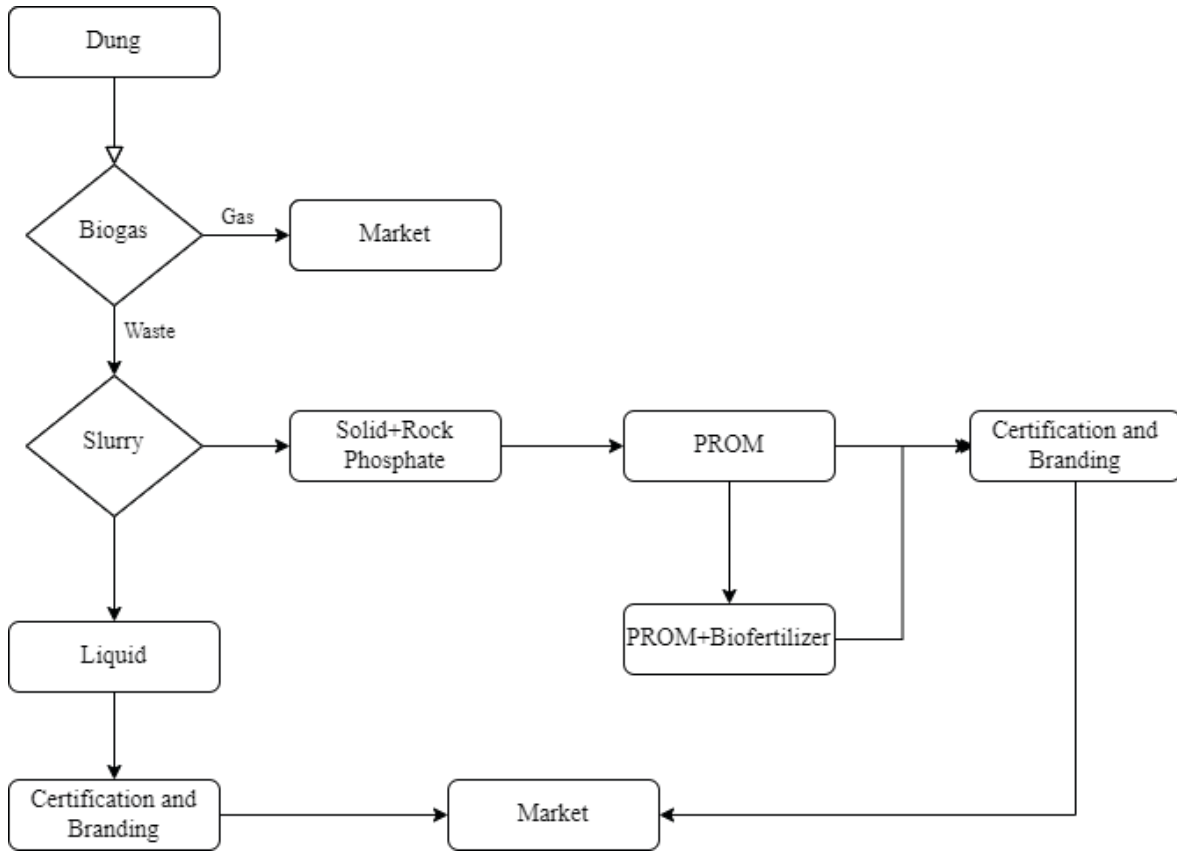


Model I: Small gaushalas (<100 bovines)

Remarks: Public support through schemes

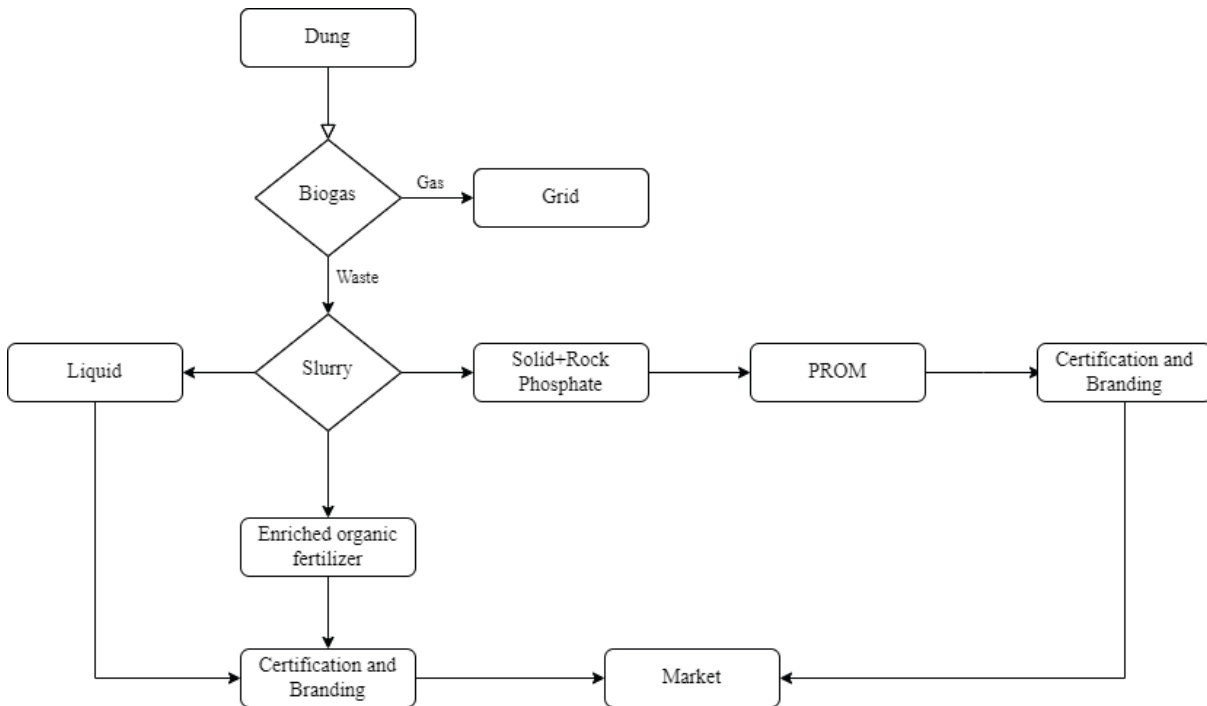


Model II: Medium (100-500 bovines)



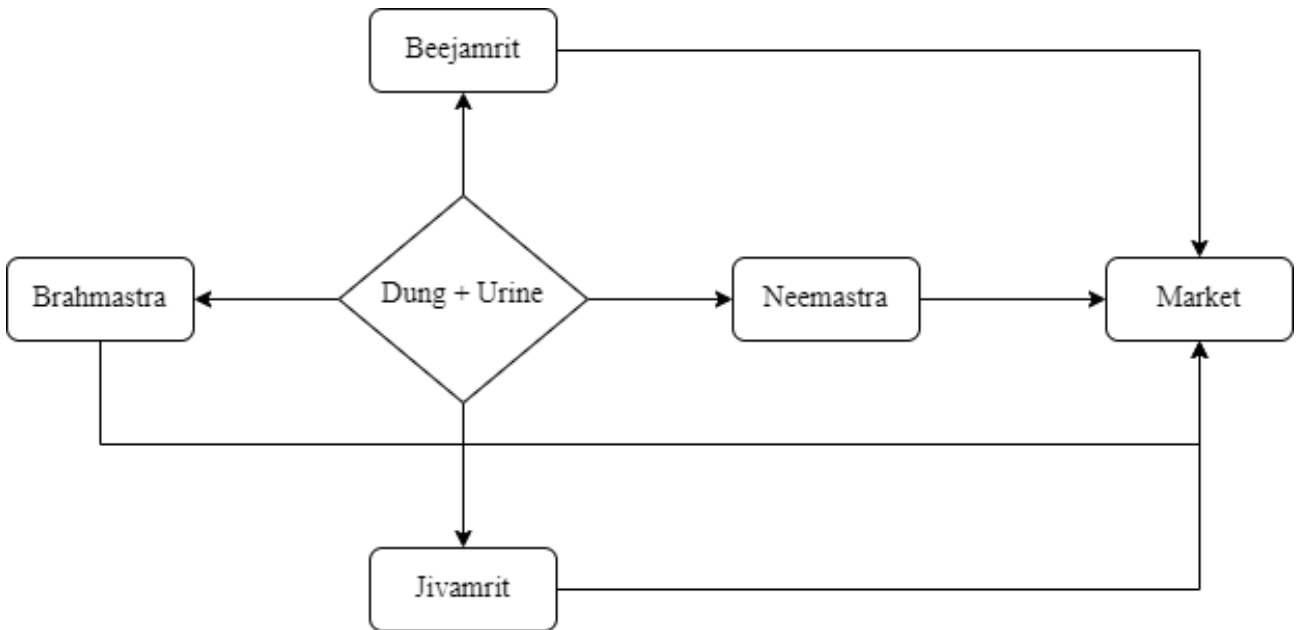
Remarks: Public support through schemes and private through capital investment and marketing

Model III: Medium (100-500 bovines)



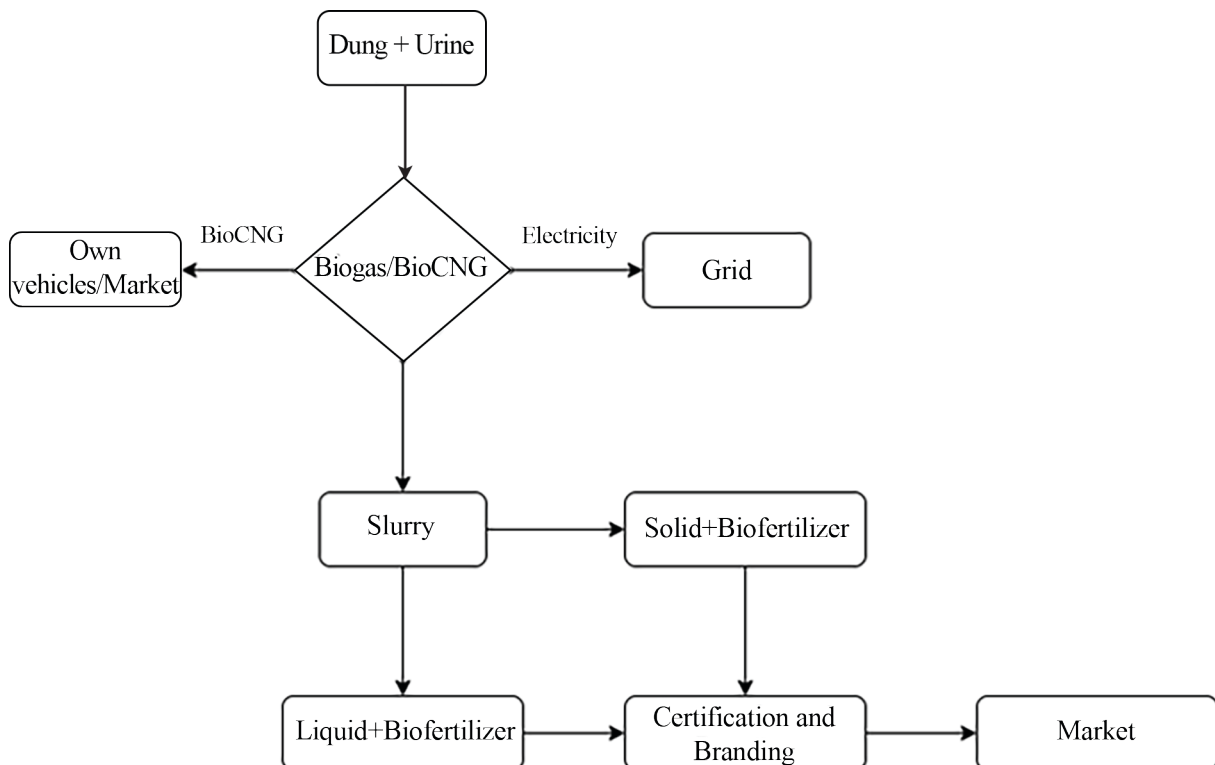
Remarks: Public support through schemes and private through capital investment and marketing

Model IV: Medium (100-500 bovines) (Natural Farming Inputs)



Remarks: Public support through schemes and marketing

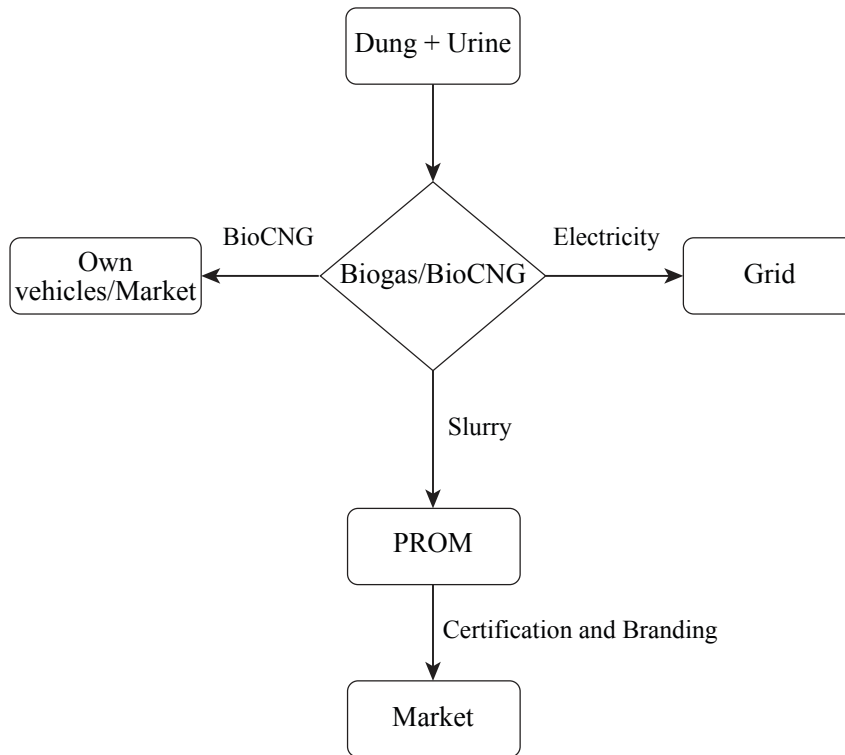
Model V: Medium (100-500 bovines) /Large (>500 bovines)



Remarks: Public support through schemes (including purchase of electricity generated) and private through capital investment and marketing



Model VI: Large (>500 bovines)



Remarks: Public support through schemes and private through capital investment and marketing

Note: Biogas contains about 55-65 % of methane, 35- 44 % of carbon dioxide and traces of other gases, such as Hydrogen Sulphide, Nitrogen and Ammonia. Biogas, in its raw form, without any purification can be used as clean cooking fuel like LPG, lighting, motive power and generation of electricity. It can be used in diesel engines to substitute diesel up to 80% and up to 100% replacement of diesel by using 100% Biogas Engines. Further, Biogas can be purified and upgraded up to 98% purity of methane content to make it suitable to be used as a green and clean fuel for transportation or filling in cylinders at high pressure of 250 bar or so and called as Compressed Bio-Gas (CBG).

SUPPORT THROUGH GOVERNMENT SCHEMES

1. **‘SATAT’ (Sustainable Alternative Towards Affordable Transportation)¹²:** This scheme on Compressed Bio Gas (CBG) envisages to target production of 15 million million tons of CBG by 2023-24, from 5000 Plants. Under SATAT scheme, entrepreneurs shall set up CBG plants, produce and supply CBG to Oil Marketing Companies (OMCs) for sale as automotive and industrial fuels. The initiative aims to produce CBG from waste and bio-mass sources like agricultural residue, cattle dung, sugarcane press mud, Municipal Solid Waste (MSW) and sewage treatment plant waste.
2. **Energy from Urban, Industrial, Agricultural Wastes/Residues and Municipal Solid Waste** programme of MNRE¹³: The programme offers Central Financial Assistance (CFA) in the form of capital subsidy and Grants-in-Aid in respect of the following activities:

12 <https://satat.co.in/satat/index.jsp>

13 <https://mnre.gov.in/waste-to-energy/schemes>

- ◆ Installation of plants of biogas production from Industrial waste, Sewage Treatment Plants (STP), urban & agricultural waste/ residue through biomethanation.
- ◆ Installation of plants of power generation or production of Bio-CNG/enriched biogas from biogas produced from Industrial waste, Sewage Treatment Plants, urban & agricultural waste.
- ◆ Installation of biomass gasifier for feeding power into the grid or meeting captive power and thermal needs of rice mills/other industries and villages.
- ◆ Installation of plants of recovery of energy/power from Municipal Solid Waste.

Criteria based on type of waste

- ◆ *Urban, Industrial and Agricultural Wastes/Residues:* The Projects based on Biomethanation of any Biodegradable Waste like Urban waste (Vegetable & fruit market/kitchen, Slaughter house, Sewage including livestock wastes like cattle dung, poultry waste etc.), agricultural waste (paddy straw, agro processing industries residues/ effluents, green grass etc.), Industrial Waste/Effluents (Agro processing industry, Paper & Pulp Industry, Milk processing, Sugar Industry etc.
 - ◆ *Biomass Gasifier:* Projects using Biomass/Agro-residues for feeding power into the grid or meeting captive power and thermal needs of rice mills/other industries and villages
3. **Agriculture Infrastructure Fund (AIF) of DACFW:** AIF provides financial support for investment in viable projects relating to post-harvest management infrastructure, community farming assets and projects on hub and spoke mode. All loans under this financing facility will have an interest subvention of 3 per cent per annum up to a limit of loan amount of ₹ 2 crores. This subvention will be available for a maximum period of 7 years. CBG plants, Biostimulant production units and Organic inputs production have been included as eligible projects of AIF¹⁴.
 4. **Swachh Bharat Kosh¹⁵:** Swachh Bharat Kosh has been set up to attract Corporate Social Responsibility (CSR) funds from Corporate Sector and contributions from individuals and philanthropists in response to the call given by Hon'ble Prime Minister on 15th August, 2014 to achieve the objective of Clean India (Swachh Bharat) by the year 2019, the 150th year of the birth anniversary of Mahatma Gandhi through Swachh Bharat Mission. Donations to the “Swachh Bharat Kosh” , other than the sums spent for “Corporate Social Responsibility” under sub-section (5) of Section 135 of the Companies Act, 2013 are eligible for 100% deduction under section 80G of the Income-tax Act, 1961. This is applicable to the assessment year 2015-16 and subsequent years. Gaushalas can be financed under “other initiatives of improving sanitation and cleanliness in rural and urban areas including solid and liquid waste management”.

14 <https://agriinfra.dac.gov.in/Home/EligibleProjects>

15 <http://sbkosh.gov.in/>



5. **Galvanising Organic Bio-Agro Resources (GOBAR) dhan¹⁶:** GOBARdhan scheme is being pursued as a national programme priority under Swachh Bharat Mission Grameen-Phase II. GOBARdhan aims to support villages in effectively managing their cattle and biodegradable waste. Department of Drinking Water and Sanitation is working with the Ministry of New and Renewable Energy, Ministry of Petroleum and Natural Gas, Department of Animal Husbandry and Dairying, Ministry of Ariculture and Farmers' Welfare, Department of Agricultural Research and Education, Department of Rural Development, State Governments, public and private sector institutions and village communities to give this a shape of "Jan Andolan" so that community collective action on GOBARdhan is achieved.

Department of Drinking Water and Sanitation supports every district with technical assistance and financial support of up to ₹ 50 lakh per district to achieve safe management of cattle and biodegradable waste, help villages convert their waste into wealth, improve environmental sanitation and curb vector-borne diseases.

6. **New National Biogas and Organic Manure Programme (NNBOMP) of MNRE¹⁷:** The Ministry of New and Renewable Energy promotes installation of biogas plants by implementing Central Sector Schemes under Off-Grid/distributed and decentralised Renewable Power. The two on going schemes are:

- ◆ New National Biogas and Organic Manure Programme (NNBOMP), for Biogas Plant size ranging from 1 m³ to 25 m³ per day.
- ◆ Biogas Power Generation (Off-grid) and Thermal energy application Programme (BPGTP), for setting up biogas plants in the size range of 30 m³ to 2500 m³ per day, for corresponding power generation capacity range of 3 kW to 250 kW from biogas or raw biogas for thermal energy / cooling applications.

Eligibility Criteria

Eligibility for small biogas plant installation under NNBOMP.

- ◆ Beneficiary should have their own land/ space about 50-60 m² area for installing small biogas plant.
 - ◆ Availability of cow dung/ feedstock's & regular water supply.
 - ◆ Financial capacity for investing their own share money for biogas.
7. **CSR and other sources**
8. **Other support:** MoPNG provides support for CBG projects under SATAT in the form of assured offtake of CBG @Rs 46/kg (from the period of 1.10.2018 to 31.3.2029) + applicable taxes by OMCs/GMCs¹⁸.

Gaushalas can also be supported by adding them into the eligible entity under Capital Investment Subsidy Scheme for Vegetable and Fruit Market Waste compost, and

16 <https://swachhbharatmission.gov.in/SBMCMS/writereaddata/Portal/Images/pdf/brochure/gobardhan.pdf>

17 <https://biogas.mnre.gov.in/about-the-programmes>

18 <https://satat.co.in/satat/>

Biofertilisers - Biopesticides Production Units under National Project on Organic Farming, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, Animal Husbandry Infrastructure Development (AHIDF) and Dairy processing & Infrastructure Development Fund (DIDF). Also, loans and market assistance can also be routed through various schemes of Ministry of Micro, Small & Medium Enterprises.



6

Assessment of the Existing Standards of Organic and Biofertilisers

As per Clause 2, sub-clause (aa) of Fertiliser Control Order (FCO), 2006 “Biofertiliser are the product containing carrier base (solid or liquid) living microorganisms which are agriculturally useful in terms of nitrogen fixation, phosphorus solubilisation or nutrient mobilization, to increase the productivity of the soil and/ or crop”. As per Clause 2, sub-clause (OO) of FCO “Organic Fertilisers are substances made up of one or more unprocessed material(s) of a biological nature (plant/animal) and may include unprocessed mineral materials that have been altered through microbiological decomposition process”.

Biofertilisers included in the FCO are:

1. *Rhizobium*
2. *Azotobacter*
3. *Azospirillum*
4. Phosphate Solubilising Bacteria
5. Mycorrhizal Biofertilisers
6. Potassium Mobilising Biofertilisers (KMB)
7. Zinc Solubilising Biofertilisers (ZSB)
8. *Acetobacter*
9. Carrier based consortia (mixture of any 2 or maximum three microorganisms viz. *Rhizobium* or *Azotobacter* or *Azospirillum*)
10. Liquid Consortia
11. Phosphate solubilizing fungal Biofertiliser

Specification for various Biofertilisers are given in the Part-A of FCO, 1985 under Schedule III (Clause 2(h) & (q)].

Organic fertilisers included in the FCO are:

1. City Compost
2. Vermicompost
3. Phosphate Rich Organic Manure (PROM)
4. Organic Manure
5. Bio-enriched Organic Manure
6. Bone meal, raw



7. Bone meal, steamed
8. Potash derived from Rhodophytes
9. Fermented Organic Manure
10. Liquid Fermented Organic Manure

Specification for various Organic fertilisers are given in the Part-A of FCO, 1985 under Schedule IV (Clause 2(h) & (q)].

Notified Bio and Organic Fertiliser Testing Laboratories

As per clause 2a, sub-clause (1) (1A) & (1B) samples of biofertilisers and organic fertilisers are tested in following laboratories

1. Regional Centre for Organic and Natural Farming (RCONF), Hapur Road, Near CBI Academy, Ghaziabad
2. Regional Centre for Organic and Natural Farming, Bengaluru
3. Regional Centre for Organic and Natural Farming, Bhubaneswar
4. Regional Centre for Organic and Natural Farming, Imphal
5. Regional Centre for Organic and Natural Farming, Nagpur
6. Or other notified state Laboratories

Changes required in expanding the scope of FCO, 1985

1. The FCO does not list some of the organic and bio fertilisers prepared from livestock waste. NITI Aayog conducted a series of stakeholder consultations (which involved gaushalas, scientists, farmers, Central and State Government officials, dairy cooperatives and ministries among others) in which following products were deemed necessary for inclusion in the FCO under relevant categories:
 - i. Panchagavya
 - ii. Dasagavya
 - iii. Sheep and Goat Manure
 - iv. Poultry Manure
 - v. Sanjivak
 - vi. Gokripa Amrut
 - vii. Amrit Pani
 - viii. Fermented curd water
 - ix. Ghanjivamrut
 - x. Crystallised cow urine
2. In India, Natural farming is promoted as Bharatiya Prakritik Krishi Paddhati Programme (BPKP) under the centrally sponsored scheme- Paramparagat Krishi Vikas Yojana

(PKVY). Above-mentioned natural farming inputs should be considered for inclusion in FCO.

3. The manufacturers of organic fertilisers especially PROM, raised concerns regarding the lack of testing facilities in States which has slowed their marketing prospects. manufacturers of organic required support to timely test and label PROM products for agricultural use.
4. The information related to quality certification of Biofertiliser and Organic fertiliser may be incorporated in the labelling of final products. Special hallmark can be incorporated to certified organic and bio fertilisers. This exercise of certification may be undertaken by the Government through third party vendor and would help the farmers in identifying the safe and certified products.



7

Recommendations and Way Forward

1. Cow dung is the major produce of Gaushala. It faces several challenges in realizing its economic value. Gaushalas should be help through capacity development and other means to generate income from gobar. This should include proper processing of gobar using biogas plants, value addition, marketing and certification of the cow dung based organic as well as bio fertilisers.
2. Heavy subsidy on inorganic fertilisers especially on urea discourages use of organic sources of nutrients, which do not get any subsidy. There is a need for some parity in support for chemical fertilisers *vis-a-vis* organic and cow dung and cow urine based compost, manures, jivamrit, ghanjivamrit and other organic fertiliser formulations. This will help gaushalas to earn sizeable income from cow dung and cow urine.
3. Gaushalas themselves lack capacity to market compost and other organic fertiliser produced by them and there is no organised market and buyer for their produce. Public sector fertiliser distribution agencies like IFFCO, KRIBHCO and such state level agencies should be mandated to market standardised organic and biofertiliser produced by Gaushalas.
4. India's soils are getting depleted of organic matter. If application of organic manure and such other sources to soil is not increased, the country will face serious sustainability challenges. Nutrition quality of food produced from the soil poor in organic matter is also poor. Promoting use of cow dung manure will go a long way to improve economy of gaushalas, support natural farming and improve sustainability of agriculture. Therefore, cow dung and cow urine should be encouraged to be applied as plant nutrient supplement in farming. Also, innovative mechanism need to be put in place to mandate fertiliser selling and manufacturing agencies to sell inorganic and organic fertiliser in some ratio.
5. A trend has started to use agri biomass which is generally wasted, like paddy straw and stubble (parali), for producing compressed bio gas (CBG) using the method of anaerobic digestion. This process produces much better output when animal dung is mixed with plant biomass. Adding 20 per cent gobar to the biomass gives best result. A new scheme, like Sustainable Alternative towards Affordable Transportation (SATAT) and Galvanizing Organic Bio-Agro Resources (GOBARdhan) schemes should be launched in Central sector under the Ministry of Agriculture and Ministry of Animal Husbandry to use agri bio-waste and cattle waste available with gaushalas to produce CBG and organic manure from the slurry left after producing CBG. Special incentive to procure gas from such plants should be made and linked with payment of reasonable price to gaushalas for the cattle manure.



- Interested gaushalas should be helped through capital assistance and marketing of cow dung and cow urine-based formulations for application in agriculture. This will require some viability gap funding. NITI Aayog at the request of the Taskforce got a study done from National Council of Applied Economic Research (NCAER) to prepare technical parameters and estimates of investments and benefits and costs of possible economic activities by gaushalas. The study shows that in gaushalas, the two major components of variable costs are feed and fodder, which constitute over 91 percent of the variable expenses. Among the fixed cost components, land constitutes the dominant expense (if not received through donations) and its share is 99 percent. In sum, the total cost of running a gaushala of 1,000 cows works out to be Rs. 1,18,182 per day including land, while without land it is around Rs. 82,475. The survey shows that the income from the sale of products from gaushalas contributes only 30 percent share, while the rest is contributed by the combined receipts from donations, grants, and miscellaneous sources. The total income per day for a unit of 1,000 cows is only Rs. 50,074. This leaves large revenue gaps and renders Gaushalas economically non-viable.

To cover the revenue gap, gaushalas may be helped to make biogas and value-added products like vermi-compost, phosphate-rich organic manure (PROM), bio-fertilisers, bio-pesticides, and other products. Potential partners in the private sector, such as large corporations, non-profits, and philanthropic organizations can provide financial and other support to gaushalas (especially power and fertiliser companies).

- Some Gaushalas are not able to use public land provided to them by the government for Biogas/Organic fertilizer/Bioenergy etc due to conditions of land use. Provision should be made to alter the land use system for adopting various enterprise models by Gaushalas even via Public- Private Partnership (PPP). The facilities shall be audited by registered Auditors to ensure the fulfilment of the guidelines for livestock's health (space, food source, vaccination etc.) as defined by Animal Welfare Board.
- Total capital cost of bio-CNG plant (25 tonne/day) is about Rs. 2.1 crores and, the total operating cost plus the cost of procuring cow dung from gaushalas is approximately Rs 1.51 crore per annum. The gross annual income from the plant (income from biogas + income from PROM) works out to be Rs. 1.78 crore. While this may recover the operating costs, the recovery of fixed costs will take several years and is contingent on the demand for biogas and PROM, which is currently very low. Special efforts are required to increase awareness campaigns to popularise these products and tie up with sales and marketing networks.
- A portal should be created like Darpan portal of NITI Aayog for online registration of all Gaushalas. These registered Gaushala will be eligible to get support from animal welfare board. Animal welfare board may open Pradhan Mantri Pashu Aushadhi Kendra in these Gaushala to address gaps in the health sector. Also, NDDDB may support gaushalas in marketing of dairy products and sprovision of feed, fodder and ethno-veterinary practices.
- The standards prescribed for cow dung based organic fertilisers in the Fertiliser Control Order of the Gol should be revisited for wider inclusion of cow dung and

cow urine-based products. Existing testing facilities for organic fertiliser including recommendations thereof should be extended to all existing and new formulations of products based on cow dung.

11. Specific policy measures and support is required to encourage the commercial production, packaging, marketing & distribution of cow dung based organic fertilisers including brand development. Private sector should be attracted to invest in mass scale production of organic and bio fertiliser, bio pesticides, soil enriching products, and stimulants for use in agriculture and various types formulations for use in households.
12. Goal of promoting natural farming in the country should be integrated with cow economy and the products viz. Jivamrit, Neemastra, Brahmastra, Dashparni ark etc. should be encouraged in farming practices.
13. Public sector institutions and parastatals should be mandated to market organic and bio fertilisers produced by Gaushalas. They should also be encouraged to set up cow dung based organic fertilisers plants.
14. The cow dung based organic fertilisers (in the farm fertiliser mix) would have a huge impact in fulfilling the constitutional mandate under Article 48 (that the State shall ...,in particular, take steps for preserving and improving the breeds, and prohibiting the slaughter of cows and calves and other milch and draught cattle) by turning our indigenous cattle into productive assets.
15. Explore the possibility of integrating of the chemical fertilisers with cow dung based organic fertilisers (similar to ethanol blending in petroleum concept).
16. Gaushalas should be liberally financed for making capital investments and working expenses at concessional rates of interest. All grants should be linked to the number of cows (more emphasis should be on dry, rescued or abandoned cattle).
17. Gaushalas should be helped to create additional sources of income by making investments in Solar plants on its buildings and Solar trees in the land with Gaushalas.
18. Fertilizer Control Order should be reformed as under:
 - i. It has been observed that a regulatory process for Bio and Organic fertilisers differs from State to State. There is a need for uniformity in regulatory process accommodating state specificities across India for registration and marketing of Bio and Organic fertilisers.
 - ii. Clause 7 and 8 of the FCO 1985 allows State Governments, by notification in the Official Gazette, to exempt from the requirement of registration or grant of authorization letter for any person selling fertiliser to farmers in such areas and subject to such conditions as may be specified in that notification. Dealers/retailers marketing Organic fertiliser in small packaging, not weighing more than 5 kg (net) and dealers/retailers having stock of Organic Fertiliser up to 50 ton at a given time be exempted from obtaining a certificate of registration or authorization letter under Fertiliser Control Order (FCO) 1985 by State Government.
 - iii. Licensing and registration requirement for sale of produce of Gaushalas should



- be simplified and harmonised across states to allow smooth marketing across pan India. States should also respect test reports from accredited laboratories in any State.
- iv. Digitalisation of registration process and licensing procedure for manufacturing organic and bio fertilisers.
19. Suitable Incentive/ Policy Intervention is essential to encourage production and consumption of organic fertilisers as under:
- i. Extension of subsidy/Market Development Assistance (MDA) for biofertiliser in line with city compost - ₹ 1500/Ton which was provided till 30th September 2021.
 - ii. Mandatory 10-20% off-take of bio-fertiliser/organic manure/fertiliser by fertiliser companies. Example: mandatory off-take of 2 bags of bio-fertiliser or one bag of enriched Organic-fertiliser (PROM etc.) with one bag of urea.
 - iii. Gaushalas should be included in the beneficiary list of all the central sector schemes related to dairying and animal husbandry, waste to wealth and renewable energy like GOBARdhan, Sustainable Alternative towards Affordable Transportation (SATAT), Animal Husbandry Infrastructure Development Fund (AHIDF), Rashtriya Gokul Mission (RGM).
 - iv. Involvements of Gram Panchayat with gaushalas for establishing the bio gas, BioCNG and organic fertiliser units with convergence of related central sector programmes.
 - v. Gaushalas should be allotted or leased unused government land or gau char bhumi (गौ चर भूमी) free from all litigation or illegal possession for fodder cultivation.
20. Involvement of Gram Panchayat for providing support to Gaushalas for creation of fodder bank through MNREGA scheme.
21. State Government's should favourably consider promotion and use of products developed from cattle wastes along with allocation of Pastures/Grazing lands for Gaushalas.
22. Research and Development in efficient management of waste should be encouraged in ICAR-State Agricultural Universities, Dairy Research Institutes and other research Institutions.

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