

Cow Dung: Opportunity for Farmers and the Environment

Aradhya Sahdev, Gautam Jain and Soumya Aggarwal

Students of grade 11th commerce stream, Birla Vidya Niketan, New Delhi

DOI: 10.46609/IJSSER.2024.v09i09.034 URL: <https://doi.org/10.46609/IJSSER.2024.v09i09.034>

Received: 15 September 2024 / Accepted: 27 September 2024 / Published: 30 September 2024

ABSTRACT

This research explores the multifaceted opportunities presented by cow dung as a valuable resource for both farmers and environmental sustainability. Investigating innovative initiatives such as the GOBAR-DHAN scheme and the Godhan Nyay Yojana, the study examines how cow dung can serve as a transformative agent in enhancing farmers' income and reducing environmental burdens. From the conversion of cow dung into compressed biogas and organic fertilisers to its role in promoting organic farming practices, the paper highlights the potential of this often overlooked agricultural byproduct. By analysing successful pilot projects and governmental schemes, the research aims to underscore the economic benefits for farmers and the positive environmental impact, positioning cow dung as a key player in shaping a more sustainable and prosperous future for agricultural communities and the environment.

Keywords: Cow dung, an agricultural byproduct, environmental sustainability, GOBAR-DHAN scheme, Godhan Nyay Yojana, compressed biogas, organic fertilisers, organic farming, economic benefits, environmental impact, sustainable agriculture, renewable energy, livestock farming, rural development.

I. INTRODUCTION

Addressing major agricultural and environmental concerns worldwide has increased attention in recent years to the sustainable use of natural resources. A customary byproduct of cattle ranching, cow excrement is one resource that is sometimes disregarded but holds great potential. *This study explores the different benefits cow manure provides to farmers and the ecosystem.* Cow manure is a unique approach to promoting environmental sustainability and economic prosperity, as it may be used as a renewable energy source and aid in the adoption of organic farming practices. This document explores various projects and initiatives showcasing the positive impacts of cow manure on both agriculture and environmental well-being.

II. EXPLORING THE SPIRITUAL CONNECTION BETWEEN COWS AND RELIGION

Cows hold symbolic significance, representing fertility, generosity, motherhood, nourishment, the origins of life, and tranquillity. Across various mythologies and religions, cows are consistently invoked to convey themes of motherhood and related virtues. Encountering a cow in real life is considered a positive omen, believed to bring peace and prosperity. Some view it as an indication of abundance in wealth, love, resources, and other aspects of life.

In certain cultures, cows are regarded as holy and are linked to the concept of "Mother Earth." Beyond symbolising motherhood, they embody family relationships.

In the context of Buddhism, the cow is revered as the most sacred animal in India, symbolising calmness and holiness. Some Buddhists believe that a cow represents the rebirth of a human being in the endless cycles of Samsāra¹.

The act of protecting and showing kindness to animals, particularly cows, is considered good karma in Buddhism.

According to the *Srimad Bhagavad Gita*, Lord Krishna in chapter 10, verse 28 states,

‘dhenunam asmi kamadhuk’

Dhenunam- among cows, Asmi- I am, Kamadhuk- the wish-fulfilling cow

‘Among cows, I am the wish-fulfilling cow’

In Hindu texts, the cow holds exceptional reverence, largely due to the portrayal of Lord Krishna as a cowherd and protector of cows. The cow serves as a metaphor for fulfilling all desires, with its four legs representing the life objectives of material wealth, desire, righteousness, and salvation.

*Within Ayurveda*², dairy products derived from cows, such as butter, yogurt, and buttermilk, are regarded as reservoirs of nutritional, spiritual, and medicinal wealth, underscoring the revered status of cows in Hindu culture.

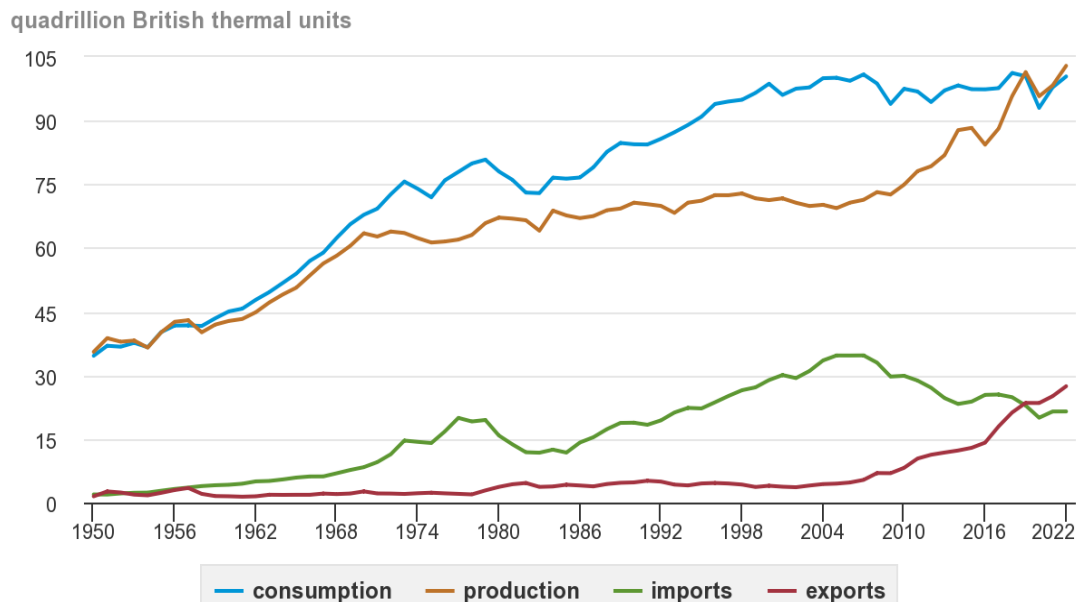
¹Samsāra (Devanagari: संसार) is a Pali/Sanskrit word that is referred to with terms or phrases such as transmigration/reincarnation, karmic cycle, or Punarjanman when related to the theory of karma it is the cycle of death and rebirth.

Additionally, cow dung is thought to possess purifying qualities that cleanse both the environment and the spirit. The utilisation of prayer essentials crafted from cow dung is thought to purify the surroundings, establishing an environment conducive to spiritual practices and nurturing positive energy.

III. UNVEILING COW DUNG AS AN ALTERNATE SOURCE

The global reliance on non-renewable energy sources such as coal, oil, and gas is on the rise, with India primarily depending on coal, constituting 44% of its total energy consumption. Despite being the world's third-largest coal producer, India is currently grappling with a coal shortage. The Energy Information Administration (EIA) reports a 38% increase in our (World) reliance on imported fossil fuels (US EIA 2014). Due to the limited availability of coal, there is a pressing need for an easily accessible, cost-effective, and environmentally friendly renewable energy source.

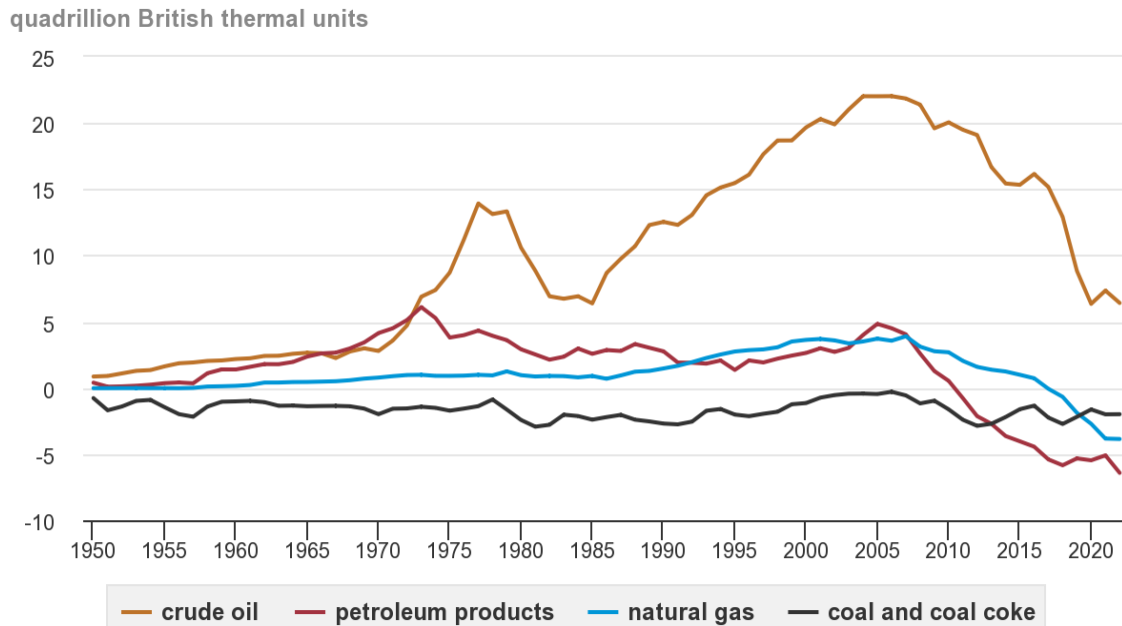
U.S. primary energy overview, 1950-2022



Data source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 1.1, April 2023, preliminary data for 2022

² Ayurveda is an alternative medicine system with historical roots in the Indian subcontinent. It is heavily practised in India and Nepal, where around 80% of the population report using ayurveda. Therapies include herbal medicines, special diets, meditation, yoga, massage, laxatives and medical oils.

U.S. energy net imports by major source, 1950-2022



Data source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 1.4 c, April 2023, preliminary data for 2022

According to the Food and Agriculture Organization of the United Nations (FAO), animal waste contributes to approximately 55–65% of methane production on Earth. Methane, when released into the atmosphere, has a warming effect 21 times greater than that of CO₂. Biogas, a mixture of gases produced through anaerobic fermentation of organic matter by methanogenic bacteria, primarily consists of methane (50–65%) and CO₂ (25–45%). Utilising readily available resources, such as cow manure, can play a crucial role in addressing this energy demand.

Amidst geopolitical tensions, including the Ukraine-Russian war and the Israeli-Palestinian³ conflict, the prices of petrol and diesel have surged. Given India's limited oil reserves, dependence on diesel and petrol becomes precarious during such conflicts. To address this vulnerability, alternative energy sources, such as cow dung, present a viable solution.

In India, cow dung serves as a major source of biogas or "gobar gas" production. With a total population of 190.90 million female cows, including 151 million indigenous and 39 million

³ According to the *business today.in* report, the World Bank urges that a prolonged Israel-Hamas conflict risks a repeat of the 1970s oil price crisis. Although Israel and the Palestinian territories are not significant oil producers, the conflict is situated within a broader, oil-rich region.

crossbreeds (Livestock Census 2012), cow dung from 3–5 cattle per day can fuel a simple 8–10 m³ biogas plant. This plant can produce 1.5 -- 2 m³ of biogas daily, sufficient for a family of 6–8 persons, supporting multiple cooking sessions, providing light for two lamps for 3 hours, running a refrigerator all day, and even operating a 3-KW motor generator for 1 hour. Additionally, farmers benefit from 13.87 metric tons of organic fertiliser annually from the biogas plant, helping recover the initial investment in setting up the plant. This co-production of biofertilizers not only addresses energy needs but also enhances agricultural sustainability.

IV. HARNESSING THE POWER OF COW DUNG FOR SUSTAINABLE FARMING

The global increase in human population has led to the expansion of intensive farming systems and inappropriate management of cropland, resulting in a decline in soil fertility.

To address nutritional deficiencies and boost crop yield, the prevalent recommendation is the extensive use of chemical fertilisers. However, the widespread adoption of these fertilisers comes with several drawbacks, including increased soil acidity, mineral imbalances, and soil degradation, leading to a growing reluctance among farmers to use them.

Composting presents an alternative approach, where microorganisms aerobically decompose organic substrates into carbon dioxide, water, minerals, and stabilised organic matter. Adding compost to the soil enhances nutrient levels and water retention capacity. Recent research indicates that incorporating cow dung into biomass from *palm oil industries* improves the physical and chemical properties of compost, along with its nutritional composition. Cow dung not only serves as a substitute for chemical fertilisers by supplementing organic matter but also acts as a soil conditioner.

Organic additions alone may not be sufficient to meet crop nutritional requirements. ISFM (Integrated Soil Fertility Management)⁴ emerges as a solution, integrating organic and inorganic resources to optimise yield responses and nutrient storage. For example, combining cow manure with NPK at concentrations of 3 t/ha and 100 kg/ha resulted in an 8.9 t/ha increase in potato tuber yield compared to the control yielding only 1.8 t/ha. In comparison to untreated soil, this combination increased soil organic carbon from 1.33% to 3.21%, enhancing soil organic matter, phosphate availability, exchangeable ions, effective cation exchange capacity, and pH.

⁴ Integrated Soil Fertility Management (ISFM) is defined as a set of practices, necessarily involving the use of fertilisers, organic inputs and improved germplasm, combined with knowledge of how to adapt these practices to local conditions, aimed at maximising the agronomic use efficiency of applied nutrients and improving crop productivity.

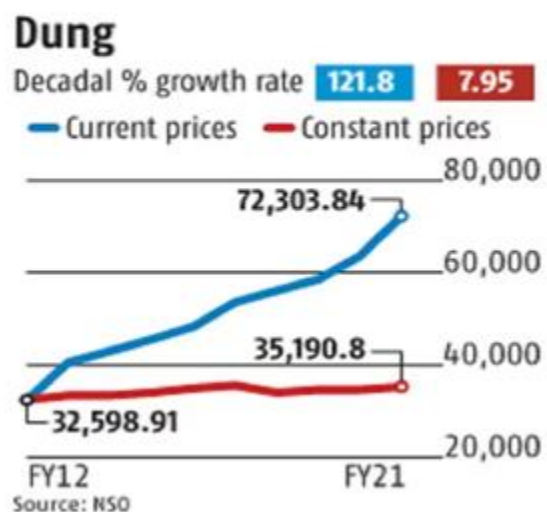
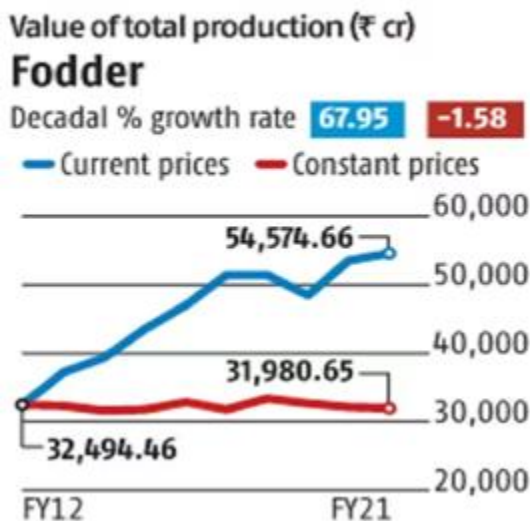
Cow dung microorganisms are now being employed to enhance soil fertility and improve crop yield. Biodynamic preparations derived from cow dung exhibit antagonistic effects against plant pathogens like *Rhizoctonia bataticola*. Studies have shown that cow dung extract is more effective than antibiotics such as Penicillin, Paushamycin, and Streptomycin in controlling bacterial blight in rice. In the realm of Indian subcontinental agriculture, cow dung is conventionally applied to not only enhance various soil properties but also serve as a source of microorganisms producing environmentally friendly biological nematicidal agents. Therefore, advocating for the use of cow dung in agriculture is crucial.

V. UNVEILING THE HIDDEN ECONOMIC GOLD IN COW DUNG

According to an NSO report, cattle dung has proven to be economically invaluable, surpassing the gross value of fodder consumed by cattle. In 2019-20, the gross value of output from dung increased by 6.8% to ₹34,825.75 crore, exceeding the total value of fodder. In fact, 128 other items, including essential agricultural products like maize, mustard, onion, and potato, as well as commodities such as eggs, soybean, tea, coffee, and cashew nuts, have lower values compared to dung.

Furthermore, the economic potential of cow dung extends beyond traditional agriculture. Cow dung paint, a biodegradable and non-toxic substance, presents a lucrative opportunity in the global paint market, which is expected to reach \$209.4 billion by 2026. This eco-friendly paint trend aligns with the increasing demand for sustainable products due to heightened consumer awareness and stringent environmental regulations.

FODDER FOR THOUGHT



The production of cow dung paints is economically viable and easily available. All the materials used by the government are from cow dung. It also leads to a shift in the use of sustainable products. This can also lead to the growth of our economy as due to this many jobs will be made as more labourers will be needed for production, and it will also lead to a growth in jobs in auxiliaries to trade. Additionally, the global shift towards sustainable products creates opportunities for higher price premiums and profit margins.

The manufacturing process for cow dung paint is not only economically viable but also technologically advanced, allowing for the production of high-quality, odourless paint. This scalability makes the procedure suitable for both small- and large-scale enterprises.

Localisation further enhances commercial viability by reducing logistics costs and stimulating local economies through job creation, particularly in developing countries with large cattle populations. The cow dung paint industry has the potential to significantly contribute to rural development, reduce unemployment, and alleviate poverty, particularly in regions with high cattle populations.

VI. GOVERNMENT SUPPORT AND SCHEMES

In February 2018, under the leadership of Narendra Modi, the Central Indian government introduced the innovative GOBAR-DHAN scheme, focusing on bovine-related initiatives to achieve dual objectives of increasing farmers' income and promoting clean energy. This initiative, an extension of the Swachh Bharat Mission, emphasises village cleanliness, provides a steady income for rural households, and generates energy from cattle waste.

The GOBAR-DHAN program aims to enhance farmers' earnings by converting biodegradable waste into compressed biogas (CBG), fostering the establishment of community-based CBG plants in rural areas, and attracting entrepreneurs to participate. Villages near the central Indian city of Indore are being generously compensated for contributing cattle waste in a pilot project to meet the city's power needs, with one farmer selling truckloads of manure, exceeding the average monthly income of Indian farming households.

Another noteworthy scheme is the Godhan Nyay Yojana by the Bhupesh Baghel's state government, launched in July 2020. This initiative promotes organic farming, generates employment in rural and urban areas, encourages cow rearing and protection, and financially benefits cattle producers. The state government has purchased millions of quintals of cow dung, disbursing substantial amounts to beneficiaries, including cow-dung sellers and women self-help groups.

Under the leadership of Chief Minister Baghel, the government planned to purchase cow dung for Rs 2 per kilogram, turn it into three kinds of compost by women from self-help groups, and sell it at a starting price of Rs 10 per kilogram. The scheme's goal is to encourage bio-fertilizers, insecticides, as well as natural agricultural practices, to reduce dependency on high-cost chemical inputs and make agriculture more sustainable.

"Natural farming is an age-old tradition that we had to bring back," said Pradeep Sharma, an aide of Chief Minister Baghel, who is tasked with the planning and execution of the Godhan Nyay Yojana⁵.

The initiative not only prevents cows from becoming stray by implementing monitoring measures, ensuring farmers' responsible care for the animals in exchange for financial incentives, but it also provides farmers with income-generating opportunities during periods of seasonal unemployment. This proactive measure serves not only to safeguard the revered animal for spiritual reasons but also as a humane endeavour.

By October 2022, government records indicate payments exceeding Rs 340 crore to cow-dung sellers, compost makers, and management committees running Gothans⁶. As of December 2022, the government has approved 11,288 gothans, with 85% constructed and functioning. Of the Gothans, 9,631 are procuring dung, and 4,372 have become self-sustaining.

The growing utilisation of this biodegradable substance will safeguard the environment and humanity from excessive chemical usage, paving the way for a healthier society and a proactive step toward disease prevention.

VII. CONCLUSION

In conclusion, cow dung emerges as a promising opportunity for farmers and the environment, showcasing the potential for innovative solutions that align with both economic and ecological goals. The initiatives discussed, such as the GOBAR-DHAN scheme and the Godhan Nyay Yojana, demonstrate a forward-thinking approach by governments in harnessing the power of cow dung.

For farmers, these programs offer a *tangible means of increasing income* by converting what was once considered waste into valuable resources like compressed biogas and organic fertilisers.

⁵ The quoted reference is sourced from indiaspend.com

⁶ Gothan is home for cattle. The concept of developing Gothan for a village is gathering all the cattle of a village in a single place to provide them food and health facilities e.g., timely vaccination of cattle

The economic benefits, as evidenced by successful pilot projects, go beyond supplementing household incomes to providing a sustainable revenue stream, contributing to the financial well-being of rural communities.

Simultaneously, the environmental impact cannot be overstated. By promoting the conversion of cow dung into biogas and compost, these initiatives reduce the environmental burden associated with traditional waste disposal methods. Furthermore, the encouragement of organic farming practices not only enhances soil health but also supports biodiversity and reduces the reliance on chemical inputs, fostering a more *sustainable and resilient agricultural ecosystem*.

In essence, the utilisation of cow dung as a valuable resource represents a harmonious convergence of economic opportunity for farmers and environmental stewardship. As these initiatives continue to evolve and gain momentum, they underscore the potential for transformative changes in agricultural practices, *contributing to a more sustainable and prosperous future for both farmers and the environment*.

BIBLIOGRAPHY

1. R Krishna Das, Raipur (2023) Chhattisgarh govt's ambitious scheme on cow dung finds many takers. *Business Standard e-paper*.
2. Deauna Roane (2022) Cow Symbolism & The Spiritual Meaning of Seeing Cows. *YourTango Article*.
3. Arthcart (2023) Significance Use Of Cow Dung: Understanding Prayer Essentials. *Arthcart*.
4. M. Devasena , V. Sangeetha (2022) Cow dung: Potential resource for sustainable agriculture. *Science Direct*.
5. Prabhudatta Mishra (2022) Valuable waste: NSO report shows cattle dung is more 'precious' than fodder. *Business Line Article*.
6. C Krishnasai (2022) How Modi govt's cow dung scheme is solving India's energy crisis and doubling farmers' income. *Wion*.
7. R Krishna Das (2023) Chhattisgarh govt spends over Rs 247 cr on cow-dung purchase in three years. *Business Standard e-paper*.
8. The Hindu Bureau (2023) Help cow shelters market dung-based formulations for farming: NITI Aayog. *The Hindu e-paper*.

9. Gargi Verma (2023) Experts Disagree On Chhattisgarh's Cow Dung Scheme As A Push Towards Natural Farming. *India Spend*.
10. Hideki Kagohashi, Enterprise Development Specialist, ILO DWT for South Asia (2012) Economics of Cow Dung: a commercialised VC with a huge Green Jobs potential. *ILO Organisation*.
11. B. Vanlauwe et al. (2010) Integrated Soil Fertility Management (ISFM Report). *IFDC Organisation*.
12. Bhoomika (2023) Farmer builds a Rs. 1 crore bungalow by selling cow milk and cow dung; Know the journey of Maharashtra-based local dairy owner . *Business Today Article*.
13. Dr. David Shurtleff, Deputy Director of NCCIH, and Dr. Craig Hopp, Deputy Director of NCCIH's Division of Extramural Research (2019) Ayurvedic Medicine: In Depth. *National Centre for Complementary and Integrative Health*.