

Carbon Credits: A Sustainable Investment for Livestock Farmers

Rashmi Vishwakarma¹ Ruchi Singh² and Amol Bhalerao³

¹Ph.D., Dept. of Vety. and A. H. Ext. Edn., C.V.Sc & A.H, Jabalpur (M.P.)

²Assistant Professor, Dept. of Vety. and A. H. Ext. Edn., C.V.Sc & A.H, Jabalpur (M.P.)

³Scientist, Training and Education Centre, ICAR- Indian Veterinary Research Institute, Pune (M.S.)

SUMMARY

Carbon credits present an opportunity for livestock farmers in India to generate additional revenue by adopting sustainable practices that reduce greenhouse gas emissions. The livestock sector is a major contributor to climate change, but strategies like improving animal nutrition, using feed additives and implementing carbon sequestration methods can help farmers earn carbon credits that can be sold on compliance or voluntary markets. While the carbon credit process involves several steps, early examples show farmers can earn hundreds of rupees per hectare by avoiding practices like burning crop residues. As India develops its domestic carbon market, these types of carbon credit projects are expected to expand, providing financial incentives for livestock farmers to transition to more climate-friendly operations.

INTRODUCTION

With the climate crisis looming ever closer, India's Prime Minister Narendra Modi has set the country the target of reaching net-zero carbon emissions by 2070 in a bid to limit global warming to 1.5 °C. For this to be achieved, Modi outlined five key commitments at COP26, including meeting 50 percent of energy demand through renewable sources and reducing the carbon intensity of the economy by more than 45 percent by 2030. Due to global warming, the global GHG emissions have continued to rise and reached a new high of 53.8 billion metric tons of carbon dioxide equivalent in 2022. According to Global annual GHG emissions shares 2022, China accounted for 29 percent of global greenhouse gas emissions in 2022, making it the world's largest emitter, followed by the United States (11.25%) and India (7.3%) (Statista, 2024). Per capita carbon dioxide (CO₂) emissions in India have climbed to 1.91 metric tons in 2022 (Statista, 2023). The Intergovernmental Panel on Climate Change, 2019, reports that agriculture and other land-use changes are responsible for about 23 percent of net anthropogenic global GHG emissions. Producing more food to meet rising food demand will emit more GHGs, which will exacerbate the impact of climate changes. This highlights the importance of adapting climate-smart agricultural and animal husbandry strategies, which lead to sustainable production systems to ensure food security under climate changes while mitigating or eliminating GHG emissions (Verschuuren, 2018). Carbon-credit systems in the agricultural and animal husbandry sector have gained wide attention globally in achieving climate neutrality, where livestock and agricultural farmers can earn extra revenue by selling their surplus of carbon credits to producers who emit higher amounts of GHGs. However, carbon-credit markets are still growing; consequently, farmers may have more opportunities in the future (Shockley and Snell, 2021). Enteric fermentation, manure management and rice cultivation are some of the biggest sources of agricultural GHG emissions, which is expected to be 425.52 million metric tons in India (Statista, 2010). The livestock sector contributes 9 percent of global carbon dioxide emissions, 35 to 40 percent of global methane emissions (chiefly due to enteric fermentation and manure) and 64 percent of global nitrous oxide emissions (chiefly due to fertilizer use (Steinfeld, 2006).

1.1 Carbon credits:

Carbon credits are the tradable certificate that represents one ton of carbon (or carbon equivalent) removed from the atmosphere. One carbon credit certifies that one metric ton of carbon dioxide has been removed from the atmosphere. It can be created by a carbon offsetting project and bought by any company or country that wants to compensate for its own emissions. In order to reach their individual targets, countries must reduce emissions on their own territory, but could also finance foreign carbon mitigation through carbon credits.

Carbon Markets:

These Carbon crediting can take place in two types of carbon markets: either compliance (mandatory) or voluntary (Aiken, 2021).

Compliance Markets:

They are established under regulatory frameworks where companies are required to meet emissions reduction targets.

Voluntary Markets:

They were operated outside regulatory requirements and companies or individuals purchase carbon credits voluntarily (not legally) to offset their emissions.

Programs:

Various programs support carbon credit generations internationally like the Paris Agreement and nationally like Green credit program and 'Carbon Credit Trading Scheme' (CCTS). CCTS was notified by the Government of India on 28 June 2023 under the 'Energy Conservation Act', 2001, to develop the country's first-ever domestic carbon market. This underlines the necessary framework and the roles of diverse stakeholders for the development and functioning of the Indian carbon market (ICM). The market will be driven by setting greenhouse gas emission intensity reduction targets in line with India's 'Nationally Determined Contributions (NDC)' for selected entities.

Mitigation measures:

Adapting mitigation measures by following 4R practices i.e. right source at the right rate, right time and right place will allow farmers to earn carbon credits, these basically fall into three broad categories: reducing emissions, enhancing removals and avoiding (or displacing) emissions.

Reducing emissions:

Methane is the normal byproduct of digestion released by ruminants through enteric fermentation, which is the largest source of methane emissions. Ruminants can produce 250 to 500 liters of methane per day. However, few changes can be made to mitigate such emissions, by Improving nutrition and health management of ruminant livestock. Addition of lipids in diet like soybean oil, Ionophore additions to beef cattle diets, particularly Monensin reduces feed intake by 5 to 6 percent, microbial flora alterations, Forage processing like Grinding and pelleting can markedly decrease methane production (Blaxter, 1989). At high intakes, methane loss per unit of diet can be reduced up to 20 to 40 percent.

Enhancing removals:

It can be done by Carbon sequestration methods like no-till farming, cover crops, nutrient management, manuring and sludge application, improved grazing, water conservation and harvesting. These offset fossil fuel emissions by 0.4 to 1.2 gigatons of carbon per year.

Avoiding (or displacing) emissions

It can be done by conversion of agricultural biomass into biofuel through biogas plants, these could help to reduce greenhouse gas emissions by up to 25 percent and provide more than 2 million tons of CO₂ eq. savings from production (FAO, 2013).

Various feed-based products that reduce methane emissions from livestock (Fig1) are

Yea-Sacc, Optigen, Agolin Ruminant, Bovaer, Digestarom, Brominata, etc.



Fig1: Various feed-based products that reduce methane emissions from livestock

Generation of carbon credit:

Projects that remove or reduce greenhouse gases from the atmosphere to counteract emissions elsewhere are called carbon offset projects. It can range from micro-scale activities. The process of generating and selling credits involves several stakeholders:

i. **Project design:** A project developer selects a methodology applicable to their proposed project type and develops a 'Project Design Document (PDD)' which mainly contains a project description, baseline determination, additionality assessment, identification of mitigation activity proponents and other requirements.

ii. **Open registry account for listing** at their chosen CCP who will review submitted documents including the PDD and may request clarification if necessary.

iii. **Validation:** Following the listing process, the project must be validated by a VVB, or so-called third-party auditors, who are responsible for assessing conformity to all relevant requirements of that particular CCP.

iv. **Registration:** Upon validation from a VVB, projects are registered with their corresponding CCPs. In certain cases, despite being validated by VVBs, a few CCPs conduct an additional review of a PDD and if approved, the carbon offset programs get registered.

v. **Project Monitoring:** When the registered carbon offset project commences, the project developer can begin monitoring and measuring emissions reductions using monitoring standards provided by their chosen CCPs such as the 'Gold Standard's Monitoring Report'.

vi. **Verification:** An accredited VVB has to verify the project, which is tasked to examine if the project impact is consistent with the standards of that particular CCP. To conduct verification, the VVB reviews monitoring reports and makes another field visit.

vii. **Issuance of carbon credits:** Based on verification reports concluded by a VVB, a project is issued a carbon credit such as Gold Standard's Verified Emission Reduction (GS-VER) or Verra's Verified Carbon Units (VCU).

For example, by not burning residues, the farmer achieves a reduction of 1.5 tons of CO₂e per hectare compared to the previous season's baseline. This reduction translates to the generation of 1.5 carbon credits per hectare with the understanding that 1 ton of CO₂e is equivalent to 1 carbon credit. Assuming a market value of US\$ 10 per carbon credit and with the agreement specifying that 60 percent of the revenue reaches the farmers, the farmer who avoided burning rice residues would receive an estimated amount of approximately INR 750 per hectare. This approach provides farmers with a financial incentive to adopt sustainable practices, such as not burning residues (Cariappa, 2023). As of 05 March 2024, a total of 12 Livestock management projects are listed in the Verra registry, however a project for vermicomposting of livestock manure in Chhattisgarh, India by SWANITI initiative is underdevelopment (VERRA, 2024). Recently, the Indore-based company Enking International has now become the world's first carbon trading company to come out with an Initial Public Offering. The company majorly operates in emerging areas of trading in carbon offsets and basically deals in market-tradable instruments like renewable energy certificates, that are issued to entities for projects with low carbon dioxide emission (Saxena, 2020).

CONCLUSION

Carbon credits have been considered one of the most significant ergonomics in the world today. It helps to promote and disseminates technologies that deliver positive benefits as production intensifies in livestock production. This promotes a win-win situation for mitigation and among competition. Urgent need to develop suitable institutional and policy frameworks, at local, national and international levels for the suggested changes to occur.

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