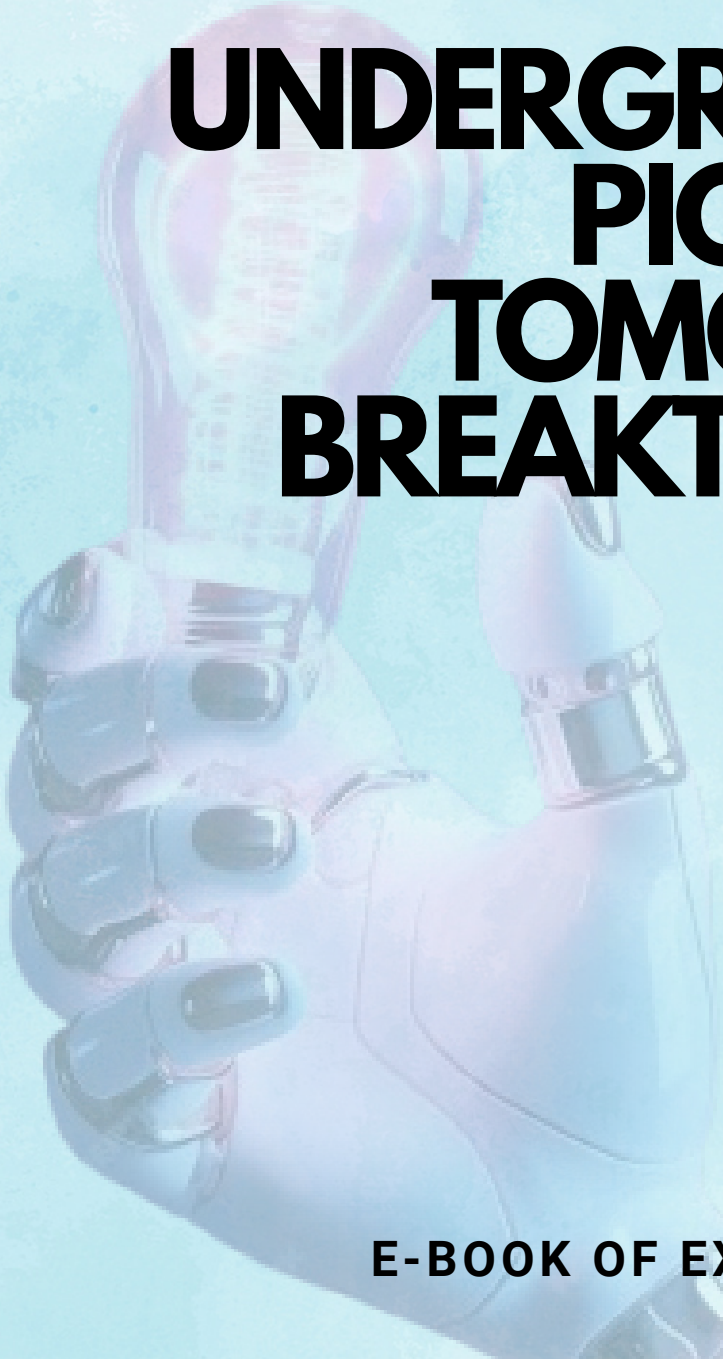


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INNOVATION, INVENTION AND DESIGN**



**UNDERGRADUATES
PIONEERING
TOMORROW'S
BREAKTHROUGH**

E-BOOK OF EXTENDED ABSTRACTS

FEEDNOVA

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ABSTRACT

This FeedNova project investigates the valorisation of organic waste through the production of nutrient-dense chicken bran as a sustainable and cost-effective alternative. This project tackles two critical issues in chicken farming: escalating commercial feed costs and the environmental effect of uncontrolled organic waste. High feed prices diminish farmers' profitability, while enormous amounts of agricultural residue and food scraps contribute to landfill overflow, greenhouse gas emissions, and pollution. To address these challenges, FeedNova develops organic chicken bran by recycling biodegradable waste such as eggshells, banana stems, anchovy heads, and coconut dregs. The production process consists of systematic collection, sorting, fermentation, drying, grinding, and formulation. Fermentation is the vital phase that considerably increases protein, fiber, and mineral content, resulting in a nutrient-rich and balanced chicken feed. The finished product of this project potentially enhances chicken growth, immunity, and productivity while minimising dependency on expensive commercial feeds. At the same time, the initiative implements a successful waste-to-wealth approach that diverts organic waste from landfills, reduces environmental pollution, and promotes circular economy principles. Finally, FeedNova presents a scalable, long-term innovation that balances economic feasibility and environmental responsibility. The initiative promotes agricultural resilience and global food security by transforming organic waste into high-quality chicken feed.

Keywords: *Waste to wealth, Circular Economy Principles, Organic Chicken Bran, Poultry Feed*

INTRODUCTION

FeedNova was created in response to a rising need to solve the interrelated concerns of agricultural sustainability, economic pressure in poultry farming, and the ongoing problem of organic waste mismanagement. The persistent reliance on commercial feed continues to put farmers, particularly small and medium-sized businesses, under increasing financial strain. According to Wongnaa et al. (2023), poultry feed alone accounts for roughly 70% of the total expense of the production. This difficulty diminishes production, limits growth options, and weakens the resilience of chicken farming in general.

At the same time, organic waste mismanagement has become a major environmental concern. Vast amounts of agricultural residue and food scraps are discarded on a daily basis, with the majority ending up in landfills. Food waste contributes to around 24% of municipal solid waste disposed of in landfills, thus generates more methane than any other material because of its rapid decomposition (Quantifying Methane Emissions From Landfilled Food Waste | US EPA, 2025). Methane, a greenhouse gas that is more destructive than carbon dioxide. Untreated organic residue also pollutes water supplies and deteriorates soil quality. What is commonly seen as waste is in fact a valuable resource that may be recycled back into farming via circular economy principles.

The FeedNova process comprises collecting, sorting, fermenting, drying, grinding, and formulating raw materials such as eggshells, banana stems, anchovy heads, coconut dregs, and other leftovers. Fermentation is a vital stage because it increases protein, fiber, and mineral content. Throughout the fermentation process, numerous essential nutrients are generated (Zhang et al., 2022). Therefore, it potentially results in

a nutrient-dense and balanced feed that promotes poultry growth, health, and productivity while decreasing reliance on pricey commercial feed.

The concept is driven by a clear problem: increasing feed costs make it challenging for farmers to remain profitable, while valued organic materials are wasted, polluting the environment. By addressing both issues simultaneously, FeedNova proposes a practical and sustainable solution that transforms waste as a valuable resource for food production. Therefore, the main objectives of FeedNova are to present farmers a low-cost alternative to industrial feed, boost poultry nutrition, and encourage sustainable farming practices. By using locally accessible resources opposed to imported feed, the initiative promotes agricultural independence, environmental conservation, and long-term food security.

Ultimately, by turning waste into valuable products, the project illustrates how farming can be both economically viable and environmentally responsible. Although this project does not rely fully on organic waste, it provides a practical and scalable waste-to-resource innovation approach that benefits farmers, communities, and ecosystems while simultaneously contributing to establishing a more sustainable and resilient food system.

RESULTS AND DISCUSSION

Potential Nutritional Value of FeedNova

The FeedNova project demonstrated that transforming agricultural residue and food scraps into organic chicken bran could significantly boost the nutritional value of poultry feed. The fermentation process, which was acknowledged as the most significant step, increased the protein, fiber, and mineral content of the bran, resulting in a balanced diet capable of maintaining healthy development and immunity in chicken. Compared to conventional feed, organic bran supplied a more natural nutritional profile that was supposed to be devoid of excessive synthetic additives.



Figure 1: Images of fermentation process as the core phase in the FeedNova production of nutrient-dense organic chicken bran.

The raw materials used in this project—corn, coconut dregs, soy dregs, banana stems, grinded rice, grinded anchovy head, grinded egg shells and chopped dried pineapples. Corn, a primary carbohydrate source in poultry diets, is critical in supplying easily digestible energy required for development and metabolic processes. According to Admin (2023), corn has high carbohydrate content which offers chickens the energy to grow and regulate their body temperature, thus a good source of protein that comprises important amino acids for muscle development and maintenance. Besides, the incorporation of coconut and soy dregs used increases the protein composition of the diet. Not only that, banana stems and grinded rice serve as additional sources of nutritional fiber and complex carbs (Ma, J. (2015). Fiber improves gastrointestinal motility and digestive efficiency, whereas rice contains starch, which increases energy density without the use of synthetic feed additives.



Figure 2: Image of materials utilized in the formulation of organic chicken bran.

Furthermore, grinded anchovy heads are a great natural source of animal protein and omega-rich oils. Beyond that, grinded eggshells give highly bioavailable calcium, which is required for good bone growth and eggshell quality in laying hens. Moreover, a chicken's body is unable to produce calcium on its own, thus they must rely only on their diet and forage to obtain calcium and therefore egg shells are also a great supplier of calcium for them (Kurczodyna, 2025). Lastly, chopped dried pineapples provide natural sugars, fiber, and trace vitamins for the poultry.

Projected Economic Implications for Poultry Farmers

The Feednova project has significantly supplied an adequate quantity of nutrients to poultry, particularly chickens. Like regular chicken bran, the Feednova is able to sustain the chicken growth. Additionally, the farmer has also benefited because it decreases reliance on costly commercial feed and is remarkably cost-effective. According to industry analysts, between 65% to 75% of the overall cost of chicken farming is spent on feed (M & M, 2025). Commercial chicken feed is frequently found to be costly due to the utilization of imported raw materials, processing expenses, and market price variations. Although Feednova does not utilize organic waste fully, this idea enables to reduce production costs by using organic waste materials as the primary input and maintain the nutritional value necessary for the healthy growth of chickens. Farmers' financial burden is supposed to be directly lessened by this affordability, particularly small-scale poultry producers that bear the burden of growing feed costs.

Anticipated Environmental Contributions through Waste Utilization

Beyond its nutritional and economic attributes, FeedNova is a significant ecological innovation. Organic waste mismanagement has grown into a major issue, with neglected agricultural residue and food scraps resulting in landfill overflow, greenhouse gas emissions, and environmental contamination. By repurposing such biodegradable materials, the initiative exemplifies circular economy concepts in practice. According to Jim (2024), converting food waste into chicken feed does not only offer a rich economic benefit but also offers a more ecologically benign alternative to the detrimental practice of burning agricultural waste. Reducing organic waste entering landfills reduces methane emissions, while reusing nutrient-rich byproducts helps to prevent soil and water pollution. Furthermore, by reducing dependency on commercial feed ingredients like maize and soybean, the initiative indirectly alleviates constraints on land usage and biodiversity. This illustrates how agricultural practices could shift from major causes to environmental deterioration towards solutions for ecological restoration.

CONCLUSION

The FeedNova project demonstrates how creative waste-to-resource solutions may alter the poultry business by balancing economic viability and environmental responsibility. The findings show that fermentation-based valorisation of agricultural and food waste produces nutrient-dense chicken bran, which may improve poultry development, immunity, and productivity while decreasing farmers' reliance on costly industrial feeds. Economically, the invention enables farmers to reduce expenses and increase profitability, particularly for small- and medium-sized businesses dealing with rising feed prices. Environmentally, it provides a scalable approach

for diverting organic waste from landfills, reducing greenhouse gas emissions, and promoting sustainable resource cycles. Ultimately, by converting waste into wealth, the effort increases farming resilience,

promotes environmental responsibility, and aligns with global demands for regenerative farming methods. This combined impact—increasing poultry output while decreasing environmental burdens—highlights FeedNova's potential to inspire broad acceptance and replication, paving the path for a more sustainable and integrated agricultural future.

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