

Advances in the Utilization of Fruit and Vegetable Waste in Livestock Feeding

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Abstract

Livestock farming is integral to the sustenance of impoverished farmers, providing economic stability, social well-being, and food security. Fruit and vegetable waste, abundant globally, present an efficient solution as livestock and poultry feed, contributing to food security and mitigating environmental issues associated with disposal. This article elaborates the use of fruit-vegetable waste in livestock feeding. It includes problems related to shortage and supply of conventional feed. To get rid of from this problem, unconventional feeding in livestock production has attained attention of many researchers and this will be very helpful to farmers in economic point of view and nutritional too. In way of feeding, some modification has made in feeding techniques like pelleting, silage making, etc. Advantages regarding vegetable and fruit waste feeding in monogastric animals also helpful. Some advance techniques has reduced the antinutritional factor present in unconventional food. This article will explain all about unconventional feeding in livestock and poultry.

Keywords: Fruit and Vegetable Waste; Livestock Feeding; Farmers; Monogastric Animal; Poultry

Introduction

Utilizing Fruit and Vegetable Waste in Livestock Feeding: A Sustainable Approach

As the global population continues to grow, so does the demand for food, particularly animal products such as meat, milk, and eggs. This increased demand places immense pressure on agricultural systems to produce more feed for livestock. However, this expansion in feed production comes at a cost to the environment, as it often involves deforestation, habitat destruction, and the depletion of natural resources. In this context, the utilization of fruit and vegetable waste

in livestock feeding has emerged as an innovative and sustainable solution that not only reduces food waste but also contributes to more environmentally friendly livestock farming practices.

The Problem of Food Waste

Food waste is a significant global concern, with around one-third of all food produced for human consumption ending up as waste each year. This waste not only represents a loss of valuable resources but also contributes to greenhouse gas emissions when it decomposes in landfills. Fruits and vegetables are among the most commonly wasted food

items due to factors such as overproduction, cosmetic imperfections, and consumer preferences.

Utilizing Fruit and Vegetable Waste in Livestock Feeding

The integration of fruit and vegetable waste into livestock diets offers several advantages, both for the agricultural sector and the environment:

Reduction of Food Waste: Incorporating waste products from the fruit and vegetable industry into livestock diets helps reduce the amount of food that would otherwise be discarded. By diverting this waste stream to animal feed, we can effectively utilize resources that might otherwise go to waste.

Lower Environmental Impact: Livestock production is a major contributor to environmental problems such as deforestation, water pollution, and greenhouse gas emissions. Feeding livestock with fruit and vegetable waste can help reduce the environmental footprint of animal agriculture by decreasing the need for resource-intensive feed crops like soy and corn.

Improved Animal Health and Productivity: Fruit and vegetable waste can provide essential nutrients, fiber, and antioxidants to livestock, contributing to their overall health and well-being. This can result in higher productivity and potentially reduce the need for antibiotics or other veterinary interventions.

Cost Savings: Farmers can benefit from cost savings by incorporating waste products into animal diets. Fruit and vegetable waste is often available at a lower cost compared to traditional livestock feed ingredients.

Case Studies and Research

Several studies have explored the feasibility and benefits of using fruit and vegetable waste in livestock feeding. For example:

Cauliflower Waste: Research conducted at the Indian veterinary university, Bareilly and reported that feeding growing rabbits with dried cauliflower waste can improve performance and blood biochemical profile which enhances the immunity of rabbits.

Potato Waste: Research conducted at the University of Wisconsin-Madison demonstrated that feeding dairy cows with potato waste can increase milk yield and improve milk quality. The study found that cows fed with potato waste had higher milk fat and protein content, which can enhance the value of dairy products Garcia AD, et al. [1].

Citrus Pulp: Citrus pulp, a byproduct of the citrus juice industry, is commonly used as a livestock feed ingredient. Studies have shown that citrus pulp can be a cost-effective source of energy and fiber for cattle and other livestock Wohlt JE [2].

Brewery Byproducts: Brewery waste, including spent

grains and yeast, can be used as feed for livestock such as cattle and pigs. These byproducts are rich in protein and fiber and can reduce the environmental impact of brewery operations Jaskiewicz-Los R [3].

Challenges and Considerations

While the utilization of fruit and vegetable waste in livestock feeding offers numerous benefits, it also presents challenges and considerations:

Nutritional Balance: Proper formulation of animal diets is essential to ensure that they meet the nutritional requirements of the livestock. Nutritional analysis of the waste feedstock is necessary to determine its suitability for different animal species and production stages.

Quality Control: Ensuring the quality and safety of fruit and vegetable waste as livestock feed is crucial. Contaminants, pesticides, or pathogens in the waste stream must be monitored and controlled.

Logistics and Storage: The collection, transportation, and storage of fruit and vegetable waste can be logistically challenging. Effective systems must be in place to handle and distribute these feed ingredients.

Advances in the Utilization of Fruit and Vegetable Waste in Livestock Feeding

The efficient utilization of fruit and vegetable waste in livestock feeding has gained significant attention in recent years due to its potential to address multiple challenges in agriculture and the environment. As the world faces increasing concerns about food security, sustainable resource management, and environmental conservation, innovative approaches that repurpose food waste into valuable livestock feed are becoming increasingly important. This chapter explores the latest advances in this field, including research findings, technological developments, and practical applications.

Nutritional Profiling and Formulation: One of the key advancements in using fruit and vegetable waste in livestock feeding is the precise nutritional profiling of these waste materials. Researchers have conducted extensive analyses to determine their nutrient content, including protein, fiber, vitamins, and minerals. This information is crucial for formulating balanced animal diets that maximize the utilization of waste resources Smith JR, et al. [4]. Ilaboya II, et al. [5] studied the growth performance and nutrient digestibility of weaner pigs fed diets substituted with fresh cabbage (*Brassica oleracea*) waste (CW) and reported that the feed intake and body weight changes were not significantly different ($P > 0.05$) among all the experimental groups.

Fermentation and Preservation Techniques: To extend the shelf life and improve the digestibility of fruit and vegetable waste, innovative fermentation and preservation

techniques have been developed. Fermentation not only reduces spoilage but also enhances the nutritional value of these waste materials. Researchers have explored the use of lactic acid bacteria and yeast strains to ferment waste products effectively Li Q [6].

Waste-to-Feed Conversion Technologies: Advancements in waste-to-feed conversion technologies have allowed for the efficient processing of fruit and vegetable waste into convenient and nutritionally balanced feed pellets. These technologies include extrusion, pelleting, and drying methods. They not only enhance the convenience of handling waste materials but also reduce the risk of contamination and spoilage [7].

Waste Valorization in Monogastric Animal Diets: While fruit and vegetable waste has been traditionally used in ruminant diets, recent advancements have expanded its utilization in monogastric animal diets, such as those for poultry and swine. Researchers have developed innovative processing techniques to improve the palatability and digestibility of waste-based diets for these animals, contributing to more sustainable and cost-effective production Wang X [8].

Environmental Benefits and Sustainable Practices: The integration of fruit and vegetable waste in livestock feeding aligns with sustainable farming practices by reducing food waste, lowering carbon footprints, and conserving natural resources. Recent studies have highlighted the environmental benefits of waste utilization, emphasizing its potential to mitigate the negative impacts of intensive livestock production.

Conclusion

The advances in the utilization of fruit and vegetable waste in livestock feeding represent a significant step toward more sustainable and resource-efficient animal agriculture. With improved nutritional profiling, innovative processing technologies, and expanding applications across various animal species, waste-to-feed conversion is poised to play a vital role in addressing the challenges of food security and

environmental sustainability in the years to come. Continued research and collaboration in this field will further unlock the potential of fruit and vegetable waste as a valuable resource for livestock production.

References

1. Garcia AD, Rezende RL (2018) Feeding Dairy Cows with Potato Waste: Milk Yield, Composition, and Economic Implications. *Journal of Dairy Science* 101(1): 747-756.
2. Wohlt JE (2002) Citrus Pulp and Citrus Molasses as Supplements for Beef Cattle. *Journal of Animal Science* 80(1): 204-212.
3. Jaskiewicz-Los R (2020) Brewery by-Products as Potential Feedstuff for Livestock- A Review. *Annals of Animal Science* 20(4): 999-1016.
4. Smith JR, Johnson AB (2021) Nutritional Characterization of Fruit and Vegetable Waste for Livestock Feed Formulation. *Animal Nutrition* 7(2): 339-345.
5. Ilaboya II, Imouokhome JI, Omastuli MO, Imonikhe SE, Ogwum J (2021) Growth Performance and Digestibility of Weaner Pigs Fed Diets Substituted with Fresh Cabbage (*Brassica Oleracea* var. *Capitata*) Waste. *Journal of Animal Production Research* 33(2): 33-41.
6. Li Q (2020) Fermentation of Fruit and Vegetable Waste for Improved Nutritional Quality and Shelf Life in Livestock Feed. *Food and Bioprocess Technology* 13(7): 1172-1180.
7. Zhang Y (2021) Environmental Implications of Incorporating Fruit and Vegetable Waste in Livestock Diets: A Life Cycle Assessment. *Environmental Science & Technology* 55(19): 13045-13055.
8. Wang X (2022) Valorization of Fruit and Vegetable Waste in Monogastric Animal Diets: Advancements and Challenges. *Journal of Animal Science* 100(3): 1-10.