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LATEST INNOVATIONS IN ANIMAL DEPARTMENT WELCOME TO THE ERA OF TECHNOLOGY AND SUSTAINABILITY

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Abstract: Rapid developments in technology and the need for environmental sustainability have driven significant innovation in animal husbandry. This research examines the latest innovations in the livestock sector that integrate the latest technology and sustainability principles. The main focus of this research is on three main aspects: information and communication technology (ICT) in livestock management, environmentally friendly livestock rearing techniques, and efficient resource management strategies. First, the application of ICT, such as the Internet of Things (IoT) and data analytics, enables real-time monitoring and management of livestock health and productivity. This system reduces the need for manual labor and increases accuracy in decision making. Second, innovations in livestock rearing techniques include the use of organic waste-based feed and waste management systems that reduce environmental impacts and increase the efficiency of resource use. Third, the sustainability approach includes land and water management methods that reduce erosion and pollution, as well as the integration of sustainable agriculture in livestock practices. This research uses qualitative analysis methods with case studies and secondary data from the latest literature to evaluate the impact and effectiveness of this innovation. The results show that the integration of technology and sustainability principles not only increases productivity and efficiency, but also contributes to reducing negative impacts on the environment. These findings provide valuable insights for the development of livestock education curricula and industrial policies that support more innovative and environmentally friendly livestock practices.

Keywords: Animal Husbandry Department, Technology, Sustainability.

Introduction

Increasingly real and extreme climate changes raise concerns about disruption of interactions between flora and fauna. Therefore, this research aims to understand how climate change affects tropical ecosystems and provide recommendations for appropriate mitigation. Innovation in the livestock department is very important because it can help sheep farming to survive, develop and progress in the modern era (Sukma & Muhammad, 2024).

In this context, this research will focus on the impact of climate change on sheep populations in tropical regions. With a deep understanding of the interactions between flora, fauna and climate, it is hoped that the right solution can be found to maintain ecosystem balance. Through collaboration between science and innovation in the livestock sector, it is hoped that it can make a positive contribution to mitigation efforts against climate change.

Innovation in the livestock department is related to the application of advanced technology and digital solutions to increase productivity, efficiency and sustainability in the Society 5.0 era. The transformation of agricultural extension requires a strategic response to the need for a more dynamic, innovative and inclusive approach (Yohanis, 2024). In facing existing challenges and opportunities. Innovation in the livestock sector can help reduce the impact of climate change on tropical ecosystems by using friendly and playful technology. With the transformation of agricultural extension that is responsive to current needs, sheep farming can continue to develop and contribute positively in the Society 5.0 era. (Dani et al., 2023)

In this way, Yohanis can utilize the genetic potential of Bali cattle and existing knowledge to create innovations that are beneficial for his farm and the surrounding environment. The latest technology that can be applied in animal husbandry is feed technology for ruminant livestock which is still dominated by small-scale people's livestock. Feed technology must provide added value such as being cheaper, faster, more profitable and more precise than existing technology. If the technology produced does not meet these criteria, then the technology will not be widely used. (Heru & Rudy, 2015).

For example, even though there is a feed technology that is cheaper and faster in the production process, if the technology does not provide added value such as improving nutritional quality for ruminant livestock, then farmers may not switch to that technology. This could result in the technology not being widely utilized and not having a significant impact on the livestock industry. It is important for technology developers to ensure that the innovation they offer meets the criteria desired by stakeholders. Only in this way will the technology be widely accepted and utilized, so that it can have a significant impact on the industry. Apart from that, collaboration between technology developers and stakeholders can also help in identifying the actual needs of the livestock industry, so that the technology developed can truly provide the desired added value.

With strong collaboration between technology developers and stakeholders, the technology development process can run more efficiently and effectively. Apart from that, stakeholders will also feel more involved and have a sense of ownership of the innovation being developed. This will ensure that the technology produced can truly provide solutions that suit the needs of the livestock industry, thereby improving the welfare of farmers and the productivity of this sector as a whole.

LITERATURE REVIEW

A. Innovation Concepts in the Animal Husbandry Sector

The concept of innovation in the livestock sector is to develop GAHP-based ruminant farming that is environmentally friendly. The main means in this concept is the dissemination of livestock technology innovations, with additional agricultural and fisheries facilities to create sustainable integration. This concept combines the strengths of livestock integration with ecological agriculture, creating a livestock model that is productive, efficient, quality and environmentally friendly (Nila & Ekowati, 2020).

Apart from that, the concept of innovation in the livestock sector also includes the use of digital technology and sensors to monitor the condition of livestock in real-time, as well as the implementation of environmentally friendly livestock practices such as the use of organic feed and efficient management of livestock waste. With this innovative concept, it is hoped that ruminant farming can develop sustainably and provide maximum benefits for the surrounding environment. Through integration between livestock, agriculture and fisheries, this innovation concept becomes a holistic solution to increase overall livestock productivity and quality.

In the field of livestock farming, there is a lack of seminars, introductions, socialization, data collection, and specialized training in innovation from innovation experts, especially in the agricultural sector. The promotion of innovation is mainly carried out through exhibitions initiated by the cooperative and SME department. There is a need for a stronger emphasis on innovation education and a campaign to promote a culture of innovation among the community. However,

efforts have been made to organize innovation competitions and recognize community innovations through awards. The development of innovative technology in livestock farming is essential for enhancing the competitiveness of regional products (Ahmad & Yudhi, 2018)

Innovation in animal husbandry is developed through the development of livestock products such as organic eggs, omega eggs, and Hen's Instant Omellete. These livestock products are beneficial for health and make it easier to transport eggs during travel. Innovation also occurs in the development of fishery products such as increasingly varied aquaculture and smart ponds that are connected to the digital industry. Technopreneurship development in Gorontalo Province is still hampered by low technological mastery among business actors, temporary technological innovation, and low competitiveness of MSME products. The entrepreneurial incubator aims to create new businesses with high economic value and competitiveness, as well as optimizing the use of educated human resources in driving the economy with science and technology (Iwan, 2020)

Various types of innovative livestock products such as organic eggs, omega eggs and instant omelettes can help increase fertility for men and women. Eggs contain minerals, antioxidants, omega-3 fatty acids, iron, saturated fat, cholesterol, choline and vitamins which are good for the body, especially for fertility. Vegetable omelettes, which are made from eggs and vegetables, can also increase fertility because they contain B complex vitamins, protein and minerals. The choline content in eggs can also prevent birth defects in babies (Budi, 2022).

Innovative livestock products can provide benefits in transportation by developing more innovative business models, such as dairy products , meat or quality livestock products that are in demand by tourists. Apart from that, food product packaging can also provide aspects of comfort in transportation through features such as easy product access, handling, easy disposal, and microwaveability (Syukri, 2011).

Innovation in animal husbandry can provide benefits to farmers with a communication strategy that emphasizes the benefits gained from innovation, such as reducing animal feed costs and increasing livestock production. The KKP-E Livestock Program also plays a role in increasing food and energy security in the livestock sector. Adoption of banana stem fermentation technology as pig feed can also provide advantages in reducing the smell of ammonia in the barn and saving animal feed costs (Endeyani & Wely, 2016)

Innovation, especially in sectors such as tourism, has a significant impact on economic growth in Bali. The economic condition of Bali, as the center of growth in this region, is expected to create a spillover effect on neighboring provinces such as West Nusa Tenggara and East Southeast, leading to economic growth in various sectors. Flow-on effects originate from growth patterns and can result in sharing of inputs, knowledge flows, and a mix of qualified local labor, contributing to economies of scale in the region. By embracing innovative design concepts and sustainable practices, Bali can enhance its aesthetic appeal and cultural authenticity, strengthen its identity as a dynamic tourism destination and sustain long-term growth (Fizza, 2020).

B. Principles of sustainability in livestock development

The concept of sustainability in tourism aims to have a positive impact on the environment and economy of local communities as well as a positive impact on the social and cultural environment in the region. Sustainable tourism products are expected to be implemented in harmony with the local environment, society and culture. The implementation of the blue economy concept in the development of coastal communities in the city of Sabang is also carried out by changing development patterns towards non-destructive ecotourism and geotourism, thereby providing a positive impact on community welfare (Rosy & Eko, 2022).

Analysis of resource flows resulting from different growth patterns affects the quality of local labor and knowledge sharing can be influenced by labor recruitment factors that influence labor costs on construction projects. Labor recruitment must be in accordance with existing job descriptions to avoid deviations in labor costs. Workforce management also involves decision-making processes related to determining the size and number of the workforce, workforce recruitment, structure and division of the workforce, planning workforce activities, and workforce

composition. Markov analysis can be used to understand movement patterns or personnel flows in organizations

Thus, Markov analysis can help project management to identify areas where changes need to be made to increase productivity and efficiency. Additionally, with a better understanding of personnel movement patterns, project management can anticipate the need for new employee training or skills development for existing employees. Thus, Markov analysis plays an important role in managing human resources and creating a more effective and efficient work environment. The integration of innovative design concepts into agricultural development to promote sustainability is carried out through the design of hydroponic agricultural areas in the City of Jakarta. This design focuses on water use efficiency, increasing crop production, developing the local economy, and increasing food independence. The result is an area that combines agricultural, marketing, tourism and educational activities to create a self-sufficient area in providing food and promoting sustainable values for the wider community (Alit et al., 2024).

Sustainable agricultural practices can increase economies of scale and promote long-term growth with collaboration between government and the private sector, including joint initiatives and industry collaboration. This partnership can promote sustainable practices and improve fishermen's livelihoods (Iwan et al., 2024).

Sustainable agricultural practices have an impact on the economic scale by ensuring that development is economically possible and farmers can obtain management knowledge, production inputs and commodity marketing easily (Samekto, 2011). Agricultural sustainability influences market prices of agricultural products through factors such as market price stability, economic feasibility of adopting sustainable agriculture, safety nets for poor farmers, market stimulation of organic products, and increased awareness of farmers about the benefits of sustainable agriculture. The role of institutions in helping the promotion and adoption of sustainable agricultural practices is also important. Agricultural extension and the role of agricultural instructors have a key role in the process of adopting farmer innovation and agricultural development (Fadila & Sri, 2022).

Methods

This research will use a qualitative approach to explore the influence of implementing sustainability principles in organic products on cultural identity and economic development in the country. The research method that will be used is a case study to gain an in-depth understanding of the topic being researched. Thus, it is hoped that this research can make a valuable contribution in strengthening the tourism sector and local economy through sustainable organic products. This research will also involve in-depth interviews with local business actors and communities involved in the production of organic products. Apart from that, direct observation will also be carried out to obtain accurate and valid data. By using the case study method, this research is expected to provide a comprehensive picture of the positive impact of organic products on cultural identity and economic development in the country. Through this research, it is hoped that a better understanding will be created about the potential of organic products to support sustainable local economic growth.

Data collection techniques used in this research include in -depth interviews with local business actors and communities involved in the production of organic products. Apart from that, direct observation will also be carried out to obtain accurate and valid data. By using the case study method, this research is expected to provide a comprehensive picture of the positive impact of organic products on cultural identity and economic development in the country. Through this research, it is hoped that a better understanding will be created about the potential of organic products to support sustainable local economic growth. Thus, it is hoped that the results of this research can become a reference for further development in strengthening the local economic sector through organic products.

The data analysis that will be carried out involves collecting primary data and secondary data to support research findings. The use of qualitative methods is also expected to provide in-

depth insight into the relationship between organic products, cultural identity and economic development. Thus, it is hoped that this research can make a significant contribution in strengthening the understanding and implementation of organic products as a solution for sustainable local economic growth.

Result and Discussion

A. Latest Innovation Developments in the Animal Husbandry Department

The latest innovation developments in the livestock department can improve the quality of organic products and expand the market for these products. Apart from that, identifying local and global market potential is also an important factor in developing organic products. By improving the quality of organic products and knowledge about market potential, it is hoped that this can provide a strong impetus for local economic growth. Apart from that, efforts to integrate cultural identity in organic products can also be an added value that differentiates organic products from other conventional products. Through the results of this research, it is hoped that it can provide effective guidance and strategies in developing organic products as a solution for sustainable economic growth.

Thus, it is hoped that the research results can provide concrete recommendations to increase the competitiveness of organic products and expand wider market reach. Apart from that, it is also hoped that the research results can become a basis for developing policies that support local economic growth through organic products. With the latest research in the livestock department, it is hoped that it can provide more detailed information regarding the best techniques for producing high quality organic products. This will help farmers to improve the efficiency and quality of their products, so they can meet increasing market demand. Local economic growth can be supported sustainably through the development of quality organic products. With ongoing research, it is hoped that breeders can continue to develop their abilities in producing high quality organic products. Apart from that, developing policies that support local economic growth through organic products can also provide encouragement for breeders to continue to improve their production standards. Not only can local markets be met, but international markets can also be reached so that local economic growth can develop more sustainably. In this way, local economic growth can develop more sustainably.

B. Implementation of Technology in Livestock Practices

Organic systems can also play an important role in improving production efficiency and product quality. Technology such as automatic irrigation systems, soil moisture sensors, and the use of environmentally friendly organic fertilizers can help farmers manage their businesses more effectively. Apart from that, the use of technology can also help monitor the health of livestock and prevent the spread of disease, thereby increasing overall livestock productivity. With the implementation of technology in organic livestock practices, it is hoped that it can bring great benefits to farmers and overall local economic growth.

The application of technology in organic farming practices can also help reduce negative impacts on the environment, such as water and soil pollution due to the use of pesticides and chemical fertilizers. Thus, technology-based organic farming can be a sustainable and environmentally friendly solution to meet increasing food needs in the future. Apart from that, with the integration of technology in organic farming, farmers can also expand market reach and increase the added value of their products, thereby increasing the overall income and welfare of farmers.

With technology continuing to develop, organic livestock can become more efficient in managing natural resources and increase productivity without having to sacrifice the environment. Apart from that, technology integration also allows farmers to carry out real-time monitoring and control of livestock conditions, so that potential losses due to disease or natural disasters can be minimized. Thus, technology-based organic farming can provide double benefits for the environment and also for the farmers themselves.

C. Sustainability Impact of Innovation

The sustainability impact of this innovation can be felt in various aspects, from product quality to farmer welfare. Apart from that, with the existence of supporting technology, organic livestock can also be an example for conventional livestock to switch to more environmentally friendly practices. Thus, efforts to maintain environmental sustainability and improve the welfare of farmers can be achieved through the adoption of technology in organic farming.

Apart from that, innovation in organic farming can also help reduce the use of pesticides and dangerous chemicals, thereby providing direct benefits to the surrounding environment. With the adoption of the right technology, organic farming can be a solution to environmental sustainability challenges and also increase overall agricultural productivity. Thus, a sustainable agricultural future can be realized through collaborative efforts between breeders, government and society in supporting organic livestock practices.

For example, organic farms use aquaponics technology to produce fish and vegetables simultaneously, creating a system that is environmentally friendly and efficient in resource use. This not only reduces the farm's carbon footprint, but also produces healthier, higher quality agricultural products for consumers.

With strong collaboration between all relevant parties, organic farming can be a sustainable solution for people's food needs. In addition, organic farming practices can also improve animal welfare and promote environmental sustainability. As more farmers switch to this method, we can create a more environmentally friendly and sustainable farming system for future generations.

Recent innovations in conventional farming practices have not been discussed in either source provided. However, it can be concluded that innovation in conventional animal husbandry may involve the development of new systems, policies or processes to increase the competitiveness of the company. Comparative studies of sharia and conventional economic law also do not provide direct information regarding innovations in conventional livestock practices. (Gani, 2022).

Technological innovation in animal husbandry can increase the productivity of beef cattle on community farms through the use of livestock waste into biogas and rice straw as animal feed. However, not all breeders accept technological changes or innovations well, even though it has been socialized to them (Djamila, 2019).

Automation systems in livestock can provide efficiency by using electronic devices that can be controlled remotely, such as the Internet of Things to provide automatic feed to chickens. This can reduce stress on broiler chickens and increase chicken production efficiency. Apart from that, the automatic system can also be used to regulate the temperature and humidity of the broiler chicken coop using Arduino, monitor room conditions in real time, and make it easier for cage owners to manage the chicken coop (Bobi et al., 2021)

Cross-generational and cross-sector collaboration can strengthen organic farming practices with the dissemination of information about environmentally friendly agricultural technologies, training for local farmers, and the establishment of online farming communities that share experiences and knowledge. Generation Z can also utilize precision farming technology to develop innovative solutions in organic farming practices. In the context of waste management, collaboration between various parties including the Surabaya City Environmental Service and the community at PDU Jambangan ensures open information and active participation in waste management programs to create sustainable solutions. Implementation of integrated agricultural innovation and cross-sector collaboration can be a sustainable solution in government (Erna et al., 2024).

Environmental Empowerment Through the Aquaponics Creation Program can improve animal welfare by utilizing ablution water which has been used as a water source for plant growth, reducing water use significantly compared to traditional cultivation methods. Aquaponics also reduces overall energy use and applies sustainability principles by maintaining a balanced level of plant reproduction without depleting natural resources and without disturbing the ecological balance (Avisema & Nugraheni, 2023).

Organic livestock practices have a positive impact on the environment, such as reducing the negative impact of nitrogen pollution compared to conventional livestock , as well as increasing soil organic matter and ecological diversity (Anne et al., 2018). Agroforestry practices can maintain the physical soil properties necessary for plant growth, such as soil structure and porosity, water holding capacity, and infiltration rate. Agroforestry can also reduce the direct impact of rainwater on the soil, protect the soil from erosion, and increase soil biological activity. Forests act as natural filters that reduce surface runoff, flood hazards and groundwater pollution (Kurniatun et al., 2003).

Changes in agricultural systems towards environmentally friendly and sustainable practices through an increase in the number of farmers switching to livestock methods can be seen from a shift in orientation from human-based agricultural systems to capital and technology that are not environmentally friendly. Apart from that, modern organic farming can also be a solution to revive Indonesian agriculture by increasing agricultural yields, maintaining the quality of agricultural commodities, and being environmentally friendly. Support from the government in implementing programs and policies is also needed for the success of organic farming (Riantama & Endang, 2024), (Risdianto, 2015).

Challenges in implementing the latest innovations include a lack of technological infrastructure readiness, limited skilled human resources, resistance to change, as well as challenges in measuring and evaluating the impact of educational innovation on overall education quality strategies. Opportunities for educational innovation in achieving better education quality strategies include the use of technology in learning and change management in optimizing opportunities in the digital era (Kun, 2023).

Conclusion

Digital innovation and technology have a very important role in developing organic farming practices. With collaboration between various parties and the adoption of digital technology, organic farming can provide greater benefits for the environment and society. Therefore, these steps need to continue to be encouraged and improved to achieve sustainability in organic farming in the future. Organic farming has great potential to meet global food needs in the future. Recommendations for further development are to increase access to training and education regarding organic farming, as well as expanding collaboration networks between farmers, researchers and the government. Apart from that, it is also important to encourage the adoption of digital technology in organic farming practices to increase efficiency and productivity. With these steps, organic farming can further develop and provide greater benefits for the environment and society as a whole.

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