

## Improving The Operational Technical Skills of Livestock Equipment at Indrapuri BPTU-HPT

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### ABSTRACT

**Objective:** BPTU -HPT Indrapuri is one of the places for refining Aceh cattle and procuring green fodder seeds. Indrapuri BPTU-HPT also functions as a place for Field Practice, Field trips, and student research. Along with the development of technology and digitalization in the world of animal husbandry, it is necessary to conduct field visits for students. These field visits aim to better understand the knowledge and use of livestock machinery. **Method:** Students visited Indrapuri BPTU-HPT in order to observe and interview officers operating livestock equipment. The methodology for implementing field visits to the use of livestock operational machinery at Indrapuri BPTU-HPT is carried out by holding field practicums on livestock operational machinery. **Results:** The study found that Indrapuri BPTU-HPT uses various types of livestock operational machines such as feed choppers, feed mixers, milkers, manure vacuum cleaners, and egg incubators to support livestock activities. The machines serve specific functions: the chopper cuts the greens, the mixer mixes the feed, the milker facilitates hygienic milking, and the manure vacuum cleaner cleans the cage. The use of these machines brings several advantages, including time efficiency, improved product quality, and labor reduction. However, challenges such as high costs, maintenance, and electricity dependence remain. These operational machines play a significant role in increasing productivity and efficiency by enabling faster feed provision and cleaner cages, which contribute to the improved purification of Aceh cattle and the overall quality of livestock feed at Indrapuri BPTU-HPT. **Novelty:** The development of livestock tools and machinery is advancing continuously. Therefore, students, in addition to studying on campus, need to gain practical experience in the field of animal husbandry. This helps them to better understand the use of tools and machinery, as well as to gain insights into livestock feed preservation and livestock care management. This hands-on learning through field visits provides students with valuable knowledge and skills that will prepare them for their future careers.

## INTRODUCTION

Improving operational skills in livestock equipment is a crucial step towards increasing productivity and sustainability in the agriculture and livestock sectors. Through the use of new technologies and best practices, a key focus is the development of efficient animal feed and the implementation of innovative solutions for livestock waste management. First, the development of efficient animal feed has the potential to improve students' skills, enabling them to gain greater knowledge and understanding of the effective use of new tools and technologies. A study by Utama et al. explained that this activity aims not only to increase the efficiency of animal feed production but also to provide training and operational modules that enhance farmers' skills in agricultural practices [1]. This training is crucial for students to ensure they understand not only how

to operate the equipment but also the principles behind the technology they use, thereby optimizing agricultural yields in accordance with sustainability standards.

Furthermore, the approach of processing livestock waste into organic fertilizer demonstrates the synergy between technology and sustainable practices. Abdullah et al. explain the importance of livestock waste processing within an integrated farming system, a model that emphasizes the concept of recycling systems and effective resource management [2]. By integrating livestock waste into organic fertilizer, farmers not only reduce waste but also increase soil fertility, which in turn positively impacts agricultural productivity. Therefore, counseling on effective livestock waste processing techniques into fertilizer is crucial in programs to improve operational skills in livestock equipment.

On the other hand, basic equipment operation skills also require a practical approach and continuous training. Good practical experience can improve technical skills in equipment operation. These skills can also be learned from laboratory experience, as explained by Eliyart and Rahayu, who explain how basic laboratory skills are practiced to hone students' psychomotor abilities [3]. Although the context is different, the principles of basic laboratory skills training can be applied to training related to livestock equipment. Understanding equipment utilization in a livestock laboratory context will accelerate the learning and application of new skills in the field.

Marhun demonstrated that a model of developing creativity through training positively impacted mentoring skills [4]. In animal husbandry, a similar approach can be applied to improve student skills, given the crucial role of trainers or mentors in providing the knowledge needed to operate livestock equipment efficiently. Directly taught skills can contribute to successful and effective equipment use, which in turn increases crop yields and livestock productivity. Effective training can also build confidence among students, making them more willing to innovate in their practices.

Adapting newer learning practices is also highly relevant, particularly in the context of the pandemic, as illustrated by Elisa et al., who demonstrated that virtual training can improve engineering laboratory skills [5]. This opens up the possibility of implementing online learning methods in training on livestock equipment operations. By leveraging information technology, farmers can access valuable learning resources without the constraints of physical distance and other limitations faced during a crisis. Implementing digital platforms for this training is crucial for the safety and health of farmers, while ensuring the ongoing skills development process.

Therefore, improving operational skills in livestock equipment can be achieved through a comprehensive approach that includes practical training in the use of new tools and technology, integrating waste processing into organic fertilizer, and utilizing modern learning methods. This will enable the ability to optimize agricultural and livestock yields while positively impacting environmental sustainability. This research has a high level of urgency for students. First, it improves their operational skills in livestock equipment through a visit to the Indrapuri BPTU-HPT. Students will learn how to operate machinery properly and maximize its utilization, reducing the time and effort required to complete routine tasks. This will empower students to create new jobs after graduation. Through

this community service program, it is hoped that there will be a significant increase in the understanding of technical skills in operating livestock tools and machines as well as the management of Aceh cattle purification care at Indrapuri BPTU-HPT.

## RESEARCH METHOD

The methodology for implementing the livestock operational machinery field practicum at Indrapuri BPTU-HPT was carried out by holding a livestock operational machinery field practicum activity at the Indrapuri Superior Livestock Breeding and Animal Feed Center (BPTU-HPT), Aceh Besar Regency. This activity lasted for one full day and was attended by students of the Animal Husbandry Study Program as part of the Animal Husbandry Equipment Operational Techniques course. The activity began with an opening and briefing by the center, which provided a general overview of the profile of Indrapuri BPTU-HPT, the types of livestock raised, and the important role of mechanization in supporting livestock operational efficiency. After the briefing, students were divided into several small groups to facilitate rotation of practice and observation at various tool and machine stations. This approach ensured that each student gained hands-on experience in operating and understanding the functions of various machines used in livestock activities.

The primary target audience for this field practicum is students in the Animal Husbandry Study Program, particularly those taking courses related to mechanization or operational management of livestock equipment. This activity is designed to equip students with an understanding and hands-on skills in the use of livestock machinery applied on an industrial scale. Furthermore, the goal of this activity is to foster a professional, disciplined, and responsive attitude to the ongoing development of livestock technology. Thus, students not only gain technical knowledge but also develop the ability to adapt and apply modern technology to future livestock practices.

The activity methods used in this field practicum are systematically and interactively designed to maximize learning objectives. Activities are conducted through a combination of lectures, demonstrations, hands-on practice, observation, and group discussions. This approach aims to strengthen theoretical understanding while improving students' technical skills in operating livestock equipment and machinery.

First, a lecture method is used in the initial phase of the activity to provide an overview of the Indrapuri BPTU-HPT and the role of mechanization in livestock farming. This provides the necessary theoretical foundation before students enter the field. Next, demonstrations are conducted by instructors or BPTU-HPT staff to demonstrate the operation and function of each machine. These demonstrations allow students to see firsthand how the machines operate in real-world conditions.

These observations help students understand the context of machine use on an industrial scale. Finally, group discussions are held to reflect on the experiences gained during the practicum. Students are given the opportunity to exchange ideas, ask questions, and discuss challenges they encounter during machine operation. These

discussions not only deepen students' understanding but also encourage collaboration and the exchange of ideas among participants.

The livestock operational machinery field practicum at Indrapuri BPTU-HPT was carefully designed to ensure students receive a comprehensive learning experience. Through a combination of lectures, demonstrations, hands-on practice, observation, and group discussions, students not only strengthen their theoretical understanding but also develop the technical skills necessary to operate livestock tools and machinery. Thus, this activity successfully achieved its goal of equipping students with relevant knowledge and skills to face the challenges of modern livestock farming.

## **RESULTS AND DISCUSSION**

### **A. Types of Livestock Operational Machines Used at Indrapuri BPTU-HPT**

Indrapuri BPTU-HPT, as one of Indonesia's leading livestock centers, has adopted various types of livestock operational machinery to increase efficiency and productivity in its livestock operations. These machines are designed to meet specific needs in the production process, from feed provision to livestock health maintenance. One of the most frequently used machines is the feed chopper. This machine functions to chop forage such as grass, corn, or sugar cane into small pieces that are easier for livestock to consume. Furthermore, a feed mixer is also used to evenly mix various feed ingredients such as concentrates, forage, and other additives. A milking machine is another very important piece of equipment, especially in dairy farming. This machine enables automatic milking, reducing reliance on manual labor. A manure vacuum is used to quickly and efficiently remove manure from the barn. Finally, an egg incubator is used to hatch poultry eggs with precise temperature and humidity control, replacing the more failure-prone natural hatching method. With these various types of machines, Indrapuri BPTU-HPT is able to carry out livestock activities more efficiently and effectively.

At the Indrapuri Center for Superior Livestock Breeding and Animal Feed (BPTU-HPT), the selection and use of operational machinery is crucial for improving the efficiency and productivity of Aceh cattle. Given the operational context at BPTU-HPT, identifying the type of machinery used can provide in-depth insights into the technical aspects of farm management. Generally, these machines are divided into two broad categories: fixed and portable. Fixed machines, commonly used in industry, offer advantages in operational stability and capacity, while portable machines are useful for applications requiring mobility in limited areas, such as small farms [6].

In the context of the Indrapuri BPTU-HPT, the use of feed machinery, particularly animal feed processing machines, is crucial. There is an urgent need for livestock farmers to improve the feed mixing process, which was previously carried out traditionally. With animal feed processing machines designed to simplify and accelerate the mixing of concentrates and forages, farmers can reduce costs and increase production efficiency [7]. These machines help prepare more uniform and high-quality feed, which in turn can improve livestock health and productivity [7]

One of the challenges faced by livestock farmers in this region is limited water supply, especially during the dry season. To address this issue, implementing a Solar-Powered Water Pump System (SPATS) can be an effective solution. Solar-powered water pumps offer advantages not only in terms of very low operational costs but also in terms of environmental sustainability [8]. The use of this technology can help reduce dependence on fossil fuels and ensure a sustainable water supply for crops and livestock during critical times.

The research also examined important aspects of Aceh cattle breeding and production quality at the Indrapuri BPTU-HPT. This study focused on estimating the breeding value and production capacity of Aceh cattle, using data collection methods involving livestock production records from recent years [9]. The results not only provide an overview of the cattle's genetic performance but also require adjustments in feed management and husbandry to align with the expected results and increase the competitiveness of Aceh cattle in the market.

Within this overall context, the management of machinery and technology assets at the Indrapuri BPTU-HPT needs to be strengthened through a digital approach. By adopting a computerized maintenance management system, the farm can achieve efficiency in managing and maintaining existing machinery. This process includes better maintenance planning, data reporting, and adequate spare parts management to ensure all machinery operates at optimal capacity [10]. Digitalization will also support farm capacity growth in line with market demands and technological developments.

Overall, the implementation of effective and efficient operational machinery at the Indrapuri BPTU-HPT not only addresses basic productivity needs but also addresses sustainability, cost efficiency, and environmentally friendly technology. The use of appropriate machinery, solar-powered pumps, and attention to breeding offer a promising combination for advancing the livestock industry in the region while maintaining environmental balance.

To continue this development, collaboration between research and field practice must be strengthened, and innovation must be continuously encouraged to address challenges in the livestock industry. The integration of new technologies and improved managerial practices will significantly impact the future of livestock farming at the Indrapuri BPTU-HPT, with the hope of creating a system that is not only efficient but also sustainable and productive.

#### **B. How Machines Work and Are Utilized in Livestock Activities at Indrapuri BPTU-HPT**

The working methods and utilization of operational machines at Indrapuri BPTU-HPT are tailored to the specific needs of livestock farming. The feed chopper chops forage using a rapidly rotating blade. The chopped forage is then fed directly to the livestock or stored as reserve feed. The feed mixer mixes feed ingredients by stirring them in a rotating drum, ensuring a more homogeneous feed mixture, thus providing a more balanced nutritional balance for the livestock. The milking machine draws milk from the cow's udder through suction cups connected to a vacuum pump. This process is not only

faster but also more hygienic than manual milking. The manure suction machine uses a vacuum system to suck manure from the barn floor. The manure is then collected in a tank for further processing as fertilizer. The egg incubator automatically regulates temperature and humidity, creating an ideal environment for egg hatching. This process minimizes the risk of hatching failure compared to natural methods. With its efficient operation, these machines have become an integral part of livestock farming activities at Indrapuri BPTU-HPT.

Machinery in livestock farming plays a crucial role in increasing efficiency and productivity. At Indrapuri BPTU-HPT, the use of modern machinery extends beyond production processes to include animal health management and environmental sustainability. For example, integrated fisheries technology utilizing renewable energy sources such as biogas and solar-powered water pumps demonstrates the potential for improving conditions on farms and offering solutions to challenges faced by farmers [11]. By introducing machinery systems such as biogas separators and feed choppers, resource efficiency can be improved, leading to increased overall production output.

Biogas produced from cow manure is a significant innovation in more environmentally friendly livestock practices. This system not only allows the use of animal waste as an energy source for cooking and lighting but also improves feed quality thanks to the use of a shredder, which produces feed that is more easily digested by cows. This method can increase cow productivity by up to 50%, as reported by Indrawati et al. [11]. Furthermore, the feed mixer is expected to ensure feed quality and prevent raw material waste. The use of this technology demonstrates that the machine can serve as a link between production efficiency and environmental sustainability.

From an operational perspective, the introduction of personal protective equipment (PPE) is also a crucial aspect of modern animal husbandry. In line with the responsibility to maintain Occupational Health and Safety, it is crucial for farmers and farm workers to understand how to use PPE effectively [12]. Increasing awareness of the need for worker protection will create a safer work environment, allowing for better use of machinery and heavy equipment without compromising safety. Research by Ulfah et al. also highlights the importance of risk management in chicken farming, leveraging an understanding of worker protection to prevent accidents when using machinery [13].

In the context of machine use, training and outreach are crucial to ensure all users can operate heavy equipment and machinery effectively. Through a series of training programs, knowledge of machine operation can be disseminated to livestock farmers so they can utilize the machinery properly. Prasetyo et al. demonstrated that through training, livestock farmers can improve their skills in operating cutting machines for optimal performance, resulting in efficient, high-quality products [14]. The application of machinery in livestock processing, such as feed shredders, is also very helpful in preparing the quality feed required by livestock in a shorter timeframe.

The success of developing machine technology in livestock farming can be seen not only in increased production but also in its impact on operational sustainability. Increased machine efficiency reduces unnecessary resource use, which in turn reduces

the environmental impact of livestock operations. Furthermore, implementing modern technologies such as solar-powered water systems makes water sourcing and management more effective and efficient. This is crucial for maintaining livestock quality of life and achieving broader livestock sustainability goals [11]. Therefore, utilizing machinery in livestock activities at Indrapuri BPTU-HPT creates a synergy between production efficiency, occupational safety, and environmental sustainability. All of this can contribute to better and more responsible livestock practices in the future.

### **C. Advantages and Challenges of Using Operational Machines at Indrapuri BPTU-HPT**

The use of operational machinery at Indrapuri BPTU-HPT offers several advantages and challenges compared to manual methods. The primary advantage of using machinery is time efficiency. Machines can complete tasks more quickly than manual methods. For example, a feed chopper can chop forage in minutes, while manual methods take much longer. Furthermore, feed mixers ensure a more even feed mix, resulting in more consistent nutrition for livestock. Machines also require regular maintenance to maintain their performance, such as replacing spare parts and lubricating. Some machines require a stable power supply, making them less suitable for areas with limited electricity supply. Furthermore, machine operators need adequate knowledge and skills to operate the machines properly. Despite the challenges, the advantages offered by these machines far outweigh the disadvantages, making machine use the primary choice at Indrapuri BPTU-HPT.

The use of operational machinery at the Indrapuri Center for Superior Livestock Breeding and Animal Feed Production (BPTU-HPT) presents various advantages and challenges. Identified advantages relate to operational efficiency, increased livestock productivity, and improved data management. Challenges include the need for workforce training, machine maintenance, and technological constraints.

First, the operational efficiency offered by the machines at Indrapuri BPTU-HPT is a significant advantage. Through the use of modern technology in the artificial insemination process, the number of cows that can be inseminated in a shorter time has drastically increased. Rahayu et al. illustrated that the success rate of artificial insemination can be reduced from the extremely high service per conception (S/C) and conception rate (C/R) [15]. By using the right machines, this process becomes faster and more accurate, thereby increasing production yields.

Second, increased livestock productivity is associated with more effective feed management using operational machinery. A study by Widyaningrum et al. stated that the Indrapuri BPTU-HPT serves as a source of superior seeds and forage management, aiming to support the sustainability of Aceh's cattle population, which has significant economic potential [16]. With efficient machinery in the feed manufacturing process, the nutritional quality provided to cattle can be better maintained, which in turn contributes to increased livestock growth and production.

Third, the development of an information system for recording and managing the distribution of superior livestock at the Indrapuri BPTU-HPT demonstrates efficiency in

data management. Nanda stated that the information system created to track the distribution of superior livestock using modern software such as Visual BASIC.NET and Microsoft Access enables efficient and organized data management, minimizing human error in recording [17]. This is crucial for improving data accuracy, which is essential for planning and decision-making in the livestock sector.

However, despite these advantages, significant challenges remain, which must be addressed to ensure sustainable technology implementation. The first challenge is the need for workforce training. Adopting new technology requires appropriate skills and training for staff at the Indrapuri BPTU-HPT. As outlined by Widyaningrum et al., to optimize Aceh cattle productivity, sound management in terms of employee training and skills development is crucial [16]. Without adequate training, the expected efficiency of machine use will not be fully achieved.

The second challenge is machine maintenance, which cannot be ignored. The use of modern machinery in daily operations requires extra attention in terms of maintenance and repair. Poorly maintained machinery can cause costly downtime and impact overall productivity. Therefore, the BPTU-HPT must have a regular and efficient maintenance program for its operational machinery.

Furthermore, technological constraints are also a relevant issue. There are technical risks associated with hardware and software resources that may not always be available. Observations of existing systems indicate potential operational lags caused by outdated software or outdated hardware [17]. Therefore, to continue technology development and implementation, adequate budget allocation and supplier support are essential.

The sustainability of operational machinery at Indrapuri BPTU-HPT depends heavily on a holistic approach. Improvements in training processes, machine maintenance, and technology updates must be prioritized to maintain existing excellence and achieve optimal results. Looking deeper into development potential, it is crucial to create synergy between technology development and human resource management at Indrapuri BPTU-HPT. The company must continuously adapt to the latest technological trends in livestock farming, while maintaining the relevance of training provided to employees to ensure efficient use of technology. Further research on the effects of machinery and new technologies on increasing Acehnese cattle productivity at BPTU-HPT is also highly recommended to provide a sustainable positive impact on the livestock sector in Indonesia.

Thus, while there are some challenges in implementing technology at Indrapuri BPTU-HPT, the clear gains in efficiency and productivity indicate that the use of operational machinery at this institution has significant potential to support the success of livestock programs in the area, provided these challenges are addressed with the right strategy. The involvement of all stakeholders in this process is essential to creating a more modern and sustainable livestock ecosystem.



#### **D. The Role of Machines in Increasing Productivity and Work Efficiency at Indrapuri BPTU-HPT**

The role of operational machinery in increasing productivity and work efficiency at the Indrapuri BPTU-HPT is significant. The use of machinery has had a positive impact on productivity and work efficiency. Feed choppers and mixers enable faster and higher-quality feed provision, enabling livestock to grow healthier and more productively. Overall, the use of operational machinery at the Indrapuri BPTU-HPT has brought about significant transformations in livestock operations, increasing productivity, efficiency, and product quality. Although challenges remain to be overcome to maximize its potential.

The role of machinery in increasing productivity and work efficiency at the Indrapuri Agricultural Technology Plantation (BPTU-HPT) is crucial, particularly in the agriculture and livestock sectors, where the use of technology can significantly improve production and operational efficiency. Production mechanization not only simplifies processes but also speeds up work times, improves product quality, and adds value to agricultural and livestock products. The right equipment technology can also empower farmers and livestock breeders to run their businesses more efficiently.

One of the main advantages of using machinery in agriculture is increased production capacity. According to research conducted by Arum et al., the use of machinery such as a baglog press can significantly increase production for oyster mushroom farmers in Karangpring Village [18]. In this context, mechanical tools accelerate the mushroom growing and harvesting process, allowing farmers to increase their output without significantly increasing labor. Similarly, in livestock production, the use of machinery such as the grass chopper and manure mixer developed by Suhartoyo et al. results in uniform cuttings and a more even and balanced feed mix. This not only improves feed quality but also helps increase overall livestock productivity.

Work efficiency also experiences a significant increase through the use of machines. An analysis of Overall Equipment Effectiveness (OEE) conducted by Suyatmo et al. shows that implementing Total Productive Maintenance (TPM) on injection molding machines is crucial for reducing production costs, increasing productivity, and increasing machine efficiency [19]. OEE is an effective tool for measuring how well a machine operates in actual use compared to its maximum potential. When OEE is increased, it reflects not only machine productivity but also the quality of the output produced. In the context of Indrapuri BPTU-HPT, increasing the OEE of agricultural machinery and other equipment can result in greater efficiency in daily operations.

More broadly, machine repair and maintaining its reliability are also crucial for productivity. Research by Apriana shows that milling machine repair plays a crucial role in increasing efficiency and productivity in the manufacturing sector [20]. Machine failure can lead to wasted time and resources. Therefore, maintaining optimal machine performance should be a priority to maximize operational efficiency at the Indrapuri BPTU-HPT.

Human resources skilled in operating and maintaining machinery also need to be considered. According to research by Astuti et al., there is a relationship between productivity and the technological content used by small and medium enterprises [21]. Adopting modern technology in daily operations involves not only machinery but also training operators to effectively utilize machine tools. Indrapuri BPTU-HPT must implement continuous training to ensure farmers and livestock workers can operate new technology effectively, contributing to increased productivity and work efficiency.

Furthermore, the use of appropriate technology can contribute to addressing challenges such as climate change and food security. With efficient and environmentally friendly machinery, the Indrapuri BPTU-HPT can ensure sustainable agricultural and livestock production and minimize negative impacts on the ecosystem. In this regard, technological adaptation not only increases production yields but also plays a role in maintaining balance with the environment.

The adoption of these machines also brings the potential for expanded collaboration between farmers and technology providers. This collaboration can not only increase access to the latest innovations but also accelerate the modernization process in the traditionally conservative agricultural sector. Through this partnership, Indrapuri BPTU-HPT can serve as a model for other organizations in implementing digital transformation in this resilient sector.

In addition, it is also crucial to create broader access to machinery technology at the Indrapuri BPTU-HPT, so that all farmers and ranchers can benefit. This could include funding initiatives to assist small businesses in purchasing or renting necessary machinery. Without adequate financial and policy support, efforts to increase productivity and efficiency will be limited to those able to invest substantial capital in technology.

As part of a long-term strategy, evaluating and monitoring machine usage and the resulting results is crucial. This process will not only help determine whether technology investments are delivering the desired results, but will also provide valuable insights into areas for further improvement. Through a data-driven approach, Indrapuri BPTU-HPT can make more informed decisions about when to upgrade equipment, train personnel, or change operational strategies.

Thus, in working towards an efficient and productive organization, Indrapuri BPTU-HPT also needs to adapt to emerging global trends, such as precision agriculture and automation. By utilizing the latest technology, BPTU can achieve a level of efficiency that not only increases productivity but also helps in better resource management and waste reduction. Looking ahead, the synergy between machines, information technology, and human experience will be key in addressing the challenges facing the agricultural and livestock sectors. With all these advantages, it is clear that the role of machines cannot be overstated in increasing productivity and work efficiency at Indrapuri BPTU-HPT. Optimal technology integration and training for farmers and workers will prove crucial in meeting increasing production needs and maintaining sustainability in the agricultural and livestock sectors in Indonesia.

## CONCLUSION

**Fundamental Finding :** This research demonstrates that the use of operational machinery at Indrapuri BPTU-HPT has significantly contributed to enhancing livestock efficiency and productivity. The machinery's introduction has provided substantial improvements, making the livestock system more efficient, productive, and sustainable, despite challenges such as high initial costs and the need for regular maintenance. These benefits far outweigh the challenges, illustrating the positive impact of technological integration on livestock farming operations. **Implication :** The findings suggest that, by continuing to optimize machinery use, Indrapuri BPTU-HPT can further enhance the quality and quantity of livestock production. The research underscores the importance of modernizing livestock systems to remain competitive in a market that is becoming increasingly competitive. The operational machinery serves not only as a means of modernization but as a tool for fostering sustainability and greater productivity within the livestock sector. **Limitation :** However, there are challenges to consider, such as the initial cost of acquiring these machines and the need for consistent maintenance to ensure their optimal performance. The high upfront cost may limit the ability of other farms or institutions to adopt similar machinery without sufficient funding or support. Additionally, the reliance on regular maintenance could become an ongoing cost that could potentially impact long-term profitability if not managed effectively. **Future Research :** Future research could explore alternative energy solutions, such as the implementation of solar panels, to reduce dependence on electricity and ensure a more stable and environmentally friendly energy source for operational machinery. Furthermore, collaborations with research institutions could help develop more efficient and sustainable machines that are tailored to the unique needs of livestock farms. Future studies might also focus on expanding the scope of research to include different farming environments and machinery types to further optimize livestock production systems.

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