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INOVATTION PROMMAGE OF MINERAL BLOCK ANIMAL FEED OF ACI KAWUNG WASTE IN BINA MANDIRI LIVESTOCK GROUP IN PULOSARI VILLAGE, WEST JAVA

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Abstract

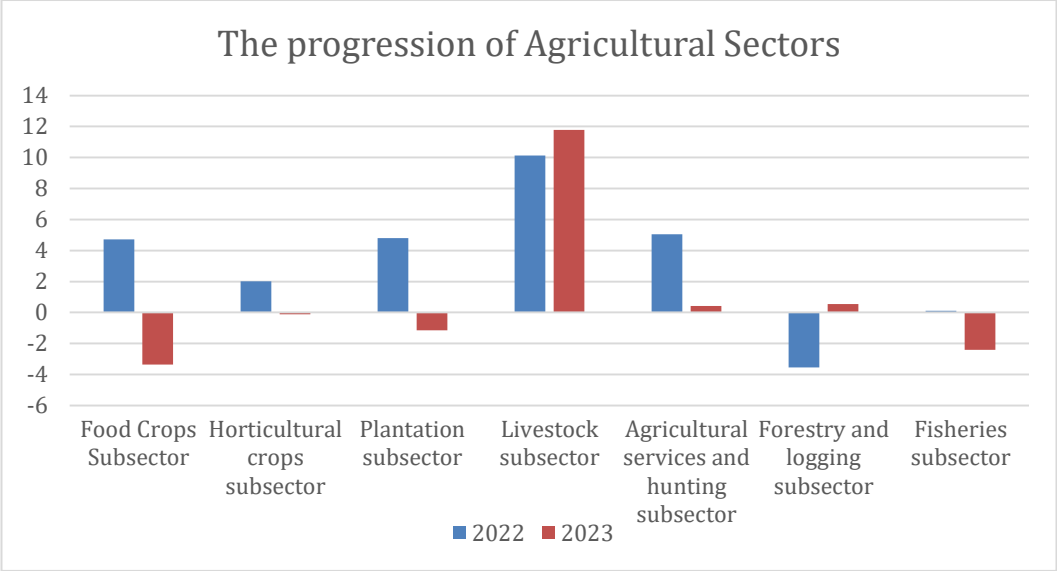
The population of Indonesia is exhibiting a constant annual growth. The latest Indonesian statistical data, from 2023, indicates that the population of Indonesia has exceeded 267 million. As a consequence of the considerable population growth, there is an increasing demand for food. One of the most significant sources of protein is animal protein, which can be derived from cattle, sheep, goats, fish, and other sources. The Elang Bodas Program represents a social innovation initiative spearheaded by CSR Community Empowerment of PT PLN Indonesia Power PLTP Gunung Salak UBP Kamojang Year 2024. The program's core objective is to enhance the efficiency and sustainability of the livestock sector in Pulosari Village. The innovation of this programme is evident at the system level. The methodology employed to address the challenges encountered comprises the following activities: (1) theoretical training (classroom-based) on the production of feed using mineral block technology, (2) direct practical experience conducted by partners under the guidance of the team, and (3) mineral block case study. The efficacy of the programme is evidenced by a notable increase in livestock weight, with an average gain of 6 kilograms observed in the experimental group compared to the control group, which did not receive similar treatment. The economic effectiveness of the programme demonstrates an additional profit of Rp. 1,700,000 per head per year. The results demonstrate that the assets have been employed in an optimal manner throughout the implementation of the Elang Bodas programme. The time effectiveness of the programme can be observed in the alterations to the timeframes involved in the provision of animal feed. The environmental impact of the programme is evidenced by the utilisation of kawung aci waste as a raw material for the production of alternative mineral block feed, which has economic value. The programme has been observed to have a significant impact on the acquisition of knowledge and skills amongst the members of the Bina Mandiri Farmer Group, with an increase of 100% in the knowledge and abilities of 38 individuals. The impact of the programme on behavioural change demonstrated that 52% of participants exhibited a willingness to adopt the technology.

Keywords: animal feed, CSR programme, mineral block, sheep.

INTRODUCTION

Indonesia is an agricultural country. Therefore, the country's development is heavily reliant on this sector, which accounts for a significant proportion of the economy. This is further reinforced by Indonesia's geographical conditions. The agricultural sector is composed of multiple subsectors. These include the food crops subsector, the horticultural crops subsector, the plantation

subsector, the livestock subsector, the agricultural services and hunting subsector, the forestry and logging subsector, and the fisheries subsector. The progression of these sectors is illustrated in the table below.



Picture 1. The Progression of Agricultural Sector

The above table illustrates that the highest growth rate in 2023 was observed in the livestock subcategory, which exhibited an increase of 11.78 percent, signifying a notable acceleration from the 2022 growth rate of 10.12 percent. Consequently, the livestock sector plays an important role in the Indonesian economy. In contrast, The population of Indonesia is exhibiting a constant annual growth. The latest Indonesian statistical data, from 2023, indicates that the population of Indonesia has exceeded 267 million. As a consequence of the considerable population growth, there is an increasing demand for food. One of the most significant sources of protein is animal protein, which can be derived from cattle, sheep, goats, fish, and other sources. One of the most significant livestock-producing regions in Indonesia is the province of West Java, as evidenced by the data presented in the following table.

Table 1. Livestock-Producing In Indonesia

West Java Region	Livestock Population (tail)								
	Beef Cattle			Goats			Sheep		
	2021	2022	2023	2021	2022	2023	2021	2022	2023
Bogor	20962	25375	20823	91558	96019	90510	290264	301875	291236
Sukabumi	21030	21136	18958	88052	88492	92913	475292	477668	304133
Cianjur	43371	44561	39590	121887	124186	124186	646457	559518	559518
Bandung	22647	22332	20812	21563	21247	18268	228460	216546	209119
Garut	30597	33248	34888	60429	64890	62397	998298	1080996	1036978

A sheep farm is a livestock enterprise that produces meat, raw materials for industrial use, or provides assistance in agricultural work. The domestic sheep (Ovis aries) is a ruminant animal that is widely maintained by the general public for the purpose of obtaining its wool, meat, and milk (Heriadi et al., 2012). As proposed by Hermawan et al. (2022), the primary objectives of sheep farming can be classified into three categories: meat production, wool production, and dual-purpose sheep (i.e., sheep that are suitable for meat or wool production).

The agricultural sector in Pulosari village has remained traditional in its approach. This results in suboptimal weight gain for the sheep, which in turn leads to a market price for Pulosari sheep that is below the standard market value. A one-year-old sheep is typically valued at Rp 2,000,000 due to its weight falling below the maximum standard. Nevertheless, lambs that do not meet the requisite age and weight are sold at a price below Rp 1,500,000. This has a significant impact on the economic status and income of the farmers, which is then allocated towards meeting the costs of daily living, including education and household expenditure.

The suboptimal growth of the lambs can be attributed to a multitude of issues pertaining to the nutritional quality of the livestock feed. The reliance of livestock farmers on limited and insufficient quantities of green feed represents a significant challenge. Furthermore, the lack of awareness and innovation among farmers in utilising and processing local feedstuffs and by-products represents a significant obstacle. Furthermore, farmers typically do not provide supplements to accelerate sheep growth, resulting in prolonged fattening periods (Wati et al., 2020). Furthermore, the accessibility of livestock feedstuffs is becoming increasingly constrained due to the rising costs of feed. The advancement of forage production for livestock is impeded by the scarcity of land, which has resulted from the allocation of land for the cultivation of food and the construction of housing.

A further issue in Pulosari village is the inadequate management of the production waste from the processing of aren/kawung rice. The village of Pulosari, situated within the Kalapanunggal district of Sukabumi, West Java, is home to six arenga palm sugar factories that lack an effective wastewater management system. While the industry provides additional income for the local population, it also generates solid and liquid waste that is discharged into the environment without prior treatment. Inadequate treatment can have a significant impact on the surrounding environment.

In 2024, the Community Empowerment CSR department of PT PLN Indonesia Power PLTP Gunung Salak UBP Kamojang implemented a social innovation activity, namely the Elang Bodas or Optimal Agricultural and Animal Husbandry Program through the Use of Biodigesters in Pulosari Village. One of the social innovations included in the Elang Bodas programme is the production of alternative sheep feed in the form of fermented feed and mineral blocks, made from a mixture of solid waste from the production of coconut sugar, also known as coconut sugar cane. This innovation addresses two pivotal concerns in the livestock sector: the constrained growth potential of sheep due to their dependence on a single feed source and the environmental issue of water pollution resulting from the production of aci kawung waste.

LITERATURE REVIEW

The provision of forage is inadequate to facilitate optimal weight gain. It is acknowledged by farmer partners that the provision of supplementary feeding in the form of complete feed additives is a necessary requirement. This type of feed is still imported, which results in a higher price point for farmers and a lack of consideration for its provision. This limitation provides the impetus for partners in the animal feed home industry to spearhead the processing of complete feed additives. However, the range of processed feed variants is limited, and the quality and quantity of these variants are not yet aligned with industry standards. It is therefore recommended that partners in the metal industry assist by manufacturing a hand press machine tool for the production of the feed. In order to facilitate the printing of large quantities of feed in a relatively short time frame, it would be beneficial for animal feed industry partners to have access to a suitable printing device (Winaruddin et al, 2018).

Mineral block is typically a mixture of molasses, urea, hardeners, fillers, and mineral sources that are utilized as a supplementary feed for ruminants. The composition of mineral block is dependent on the specific feed ingredients utilized as constituents. The objective is to fulfill the nutritional requirements of livestock, enhance the digestibility of feed nutrients, and elevate the

nutritional value of livestock. Moreover, the utilisation of mineral block as a supplement has been demonstrated to enhance livestock productivity, as evidenced by increased body weight and milk production. Additionally, it has been shown to improve livestock reproductive (Andita et al, 2024). A number of studies have identified the benefits of mineral blocks, which include the treatment of mineral deficiency diseases such as weight loss, loss of appetite, decreased endurance and production capacity, as well as the prevention of infertility, miscarriage and paralysis. The use of mineral supplementation in beef cattle and goats has a long history (Evitayami et al., 2004)..

METHOD

In order to address the aforementioned issues, a series of technical guidance sessions were conducted, encompassing a range of topics from livestock husbandry to feed processing. The methodology employed to address the challenges encountered comprises the following activities: (1) theoretical training (classroom-based) on the production of feed using mineral block technology, (2) direct practical experience conducted by partners under the guidance of the team, and (3) evaluation of the impact/effectiveness of the Elang Bodas programme.

Mineral blocks are a form of supplementary feed, comprising nutritionally dense and balanced ingredients, which are designed to supplement the diet of livestock and support optimal production. Mineral block is a form of nutritional supplementation for ruminant livestock, administered in tablet form and designed to be chewed. The product is manufactured using a combination of ingredients, including rice bran, molasses, urea, dolomite, minerals, salt, white cement, and probiotics.

Fermented feed is an alternative feed that is the result of processed animal feed technology to produce feed with higher energy and nutrition. The utilisation of fermented fodder as a substitute for scarce green fodder during the dry season represents a viable option. The process of fermentation enables bacteria to break down the nutrients present in the fodder, thereby facilitating more efficient and effective digestion in livestock. The equipment and materials utilized in the production of fermented animal feed include.

- 50 kg of biovitas grass
- 50 kg of odod grass
- 40 kg of cazzava trees
- Molasses
- 10 kg of aci kawung waste
- Probiotic replacements for EM4
- A machine for grinding grass
- 50 and 120-litre drums

The grass and cassava are pulverised using a copper mill and subsequently compressed into drums of 50 or 120 litres. To activate the probiotics in a fermented liquid form, a solution of two teaspoons of probiotics in five litres of water should be prepared, followed by the addition of molasses as a food source for the bacteria. Subsequently, the liquid was introduced into the drum containing the solid grass. At the upper portion of the drum, a layer of 5 kg of wheat grain waste granules should be added. These serve the dual purpose of providing a source of fibre and absorbing water vapour within the drum. Finally, the drum must be sealed with precision.

Picture 2. Mineral Block Fermentation Processing

The efficacy of the economic programme can be gauged by analysing the revenue generated by the product subsequent to the implementation of the restoration programme. In economic terms, revenue is defined as the total amount of money received by a producer or company from the sale of their products or services. The magnitude of revenue is a key determinant of whether a producer or company is profitable. The impact of a programme can be evaluated in a number of ways, including:

a) the effectiveness of the product;
b) the economic effectiveness;
c) the effectiveness in terms of time;
d) the impact of the programme on the environment;
e) the impact of the programme on knowledge acquisition and behavioural change;
f) the effectiveness of assets.

RESULTS AND DISCUSSION

PT PLN Indonesia Power Unit PLTP Gunung Salak UBP Kamojang is an environmentally conscious electricity generation company headquartered in the Bogor and Sukabumi regions. The objective is to achieve economic, social and environmental stability through the implementation of socially responsible initiatives that empower local communities. One of the most noteworthy current CSR programmes is the Elang Bodas initiative, which takes its name from the integrated agriculture and livestock farming programme in Pulosari village, coupled with the utilisation of biodigesters. The programme was initiated in 2021 with the objective of enhancing the quality of life of farmers and small-scale livestock keepers in Pulosari Village.

The programme comprises two principal activities: the production of biolurry, which utilises sheep manure to reduce the cost of fertiliser, and the improvement of sheep breeding at the small-scale level. The company's Corporate Social Responsibility (CSR) programme for 2024 will prioritise the enhancement of sheep farming practices through an expansion of production capacity and improvements in animal nutrition. This will be achieved by utilising the by-product of the aren't industry (Arenga engleri) as a component in the production of fermented feed and mineral blocks. In excess of 75% of the population in Pulosari village are principally engaged in agricultural activities, concurrently engaged in sheep farming. The keeping of sheep is a common practice among rural communities, serving as a form of savings for the future, with the animals themselves providing a tangible asset that can be sold or otherwise traded when needed. In the

village of Pulosari, sheep farming represents a primary source of savings for farmers, enabling them to meet the costs associated with their children's education. The practice of raising domestic sheep is undertaken by many for the purpose of enhancing their quality of life, given the numerous advantages associated with this pursuit. The sheep are typically maintained in small numbers, with three to five animals per family. The animals are traditionally bred and form part of the agricultural production system, resulting in relatively low income generation. Nevertheless, sheep offer advantageous livestock due to their adaptability, rapid reproduction, social behaviour and low initial investment requirements (Umiyati, 2021).

The primary beneficiary and principal actor in this programme is the Group of Self-Sufficient Farmers, known as Bina Mandiri. The group was established in 2016 and formally recognised in 2023, when it was granted legal status through SK No. 100.3/Kep.9/Pemdes/2023. The group is comprised of 38 small-scale farmers and livestock keepers based in Kampung Raksamala, Pulosari Village. The majority of farmers possess less than one hectare of land, with an average of 10-15 sheep per person. The results of the field survey indicate that the total accumulated land area owned by the group members is 8.28 hectares, with a total of 172 sheep. The group is comprised of nine individuals aged 60 years and above. The group is comprised of individuals who are particularly vulnerable, given that they are still required to perform physically demanding tasks at an advanced age. These tasks include searching for fodder for their livestock and engaging in agricultural activities that exceed eight hours per day. Despite engaging in two occupations and working long hours, the average income of group members remains relatively low at Rp 2,529,412 per month, which is significantly below the county-level minimum wage.

The Bina Mandiri Agricultural Group has been engaged in a collaborative endeavour with the Corporate Social Responsibility programme of PT PLN IP Gunung Salak since 2021. The partnership is scheduled to continue until 2026, during which time the group will receive a range of facilities and assistance with community empowerment. The group demonstrates a robust social capital, as evidenced by the high frequency of formal meetings, which occur at least twice a month. Following the introduction of company support, the most notable change has been the introduction of a more systematic structure and division of labour within the group, along with an enhanced capacity and capability in relation to agricultural and animal husbandry development.

Picture 3. The company's Corporate Social Responsibility (CSR) programme of PT PLN Indonesia Power Unit PLTP Gunung Salak UBP Kamojang with Bina Mandiri Group.

The Corporate Social Responsibility (CSR) programme initiated by PT PLN IP Gunung Salak commenced with a benchmarking study conducted at Bodogol Farm in June 2024, with a total of 38 participants. The objective of the study tour was to observe and learn about

contemporary livestock management techniques, feed management, the production of fermented feed and mineral blocks. A comparative study was conducted in the form of a training programme on the production of mineral blocks, utilising a wheat bran-based substitute for cornmeal, in collaboration with Bogor Agricultural University and the Directorate General of Electricity. The objective of this innovative assistance programme is to equip the local community with the requisite technology to facilitate the processing of Arenga pinnata starch (patio) into a mineral block feed. The utilisation of fermented waste provides the local community with the opportunity to produce an alternative feed source. This will facilitate the generation of economic value for the starch industry and the local population, while simultaneously improving environmental health. The innovative CSR programme from PT PLN IP Gunung Salak offers insights into the community's way of life, highlighting potential opportunities and identifying challenges faced by the community in Pulosari Village.

Picture 4. theoretical training (classroom-based) on the production of feed using mineral block technology

The decision to utilise aci kawung as the primary component of an alternative livestock feed was prompted by the prevalence of community concerns in Pulosari village regarding the contamination of local water sources by aci kawung waste. The solid and liquid waste products of the coconut palm are responsible for the pollution of the Cibojong River, which spans a distance of 12 km. The processing capacity of the entire factory is 14 tons of coconut palm per day, resulting in the generation of over 5 tons of solid and liquid waste. Despite its organic nature, the effluent has a deleterious impact on the quality of the water in Cipalasari River, causing a change in its colour and odour. The issue has prompted concern among residents, given the potential implications of poor water quality for infant and maternal health. This could consequently result in an escalation of stunting cases in Pulosari village, which exhibits the highest prevalence of stunting in Kalapanunggal subdistrict, with 41 children affected.

Picture 5. River Water Pollution Caused by The Aci Kawung Waste

As a continuation of the comparative study visit to the BPP and Polbangtan Bogor, CSR PT PLN IP Gunung Salak is providing assistance to all participants in the application of innovative alternative feed production techniques. The mentoring activities commenced in May 2024 with the inaugural trial of the production of Mineral Block in collaboration with the Polytechnic Agricultural Development Institute (Polbangtan) Bogor. The programme's innovative aspect lies in the substitution of the oats composition with that of the arenga palm waste product, or ongok aren. The detailed composition is as follows:

Table 2. The formulation is UMMB, with a total weight of 8 kg.

Ingredients	Price	Composition		Source
		Gram	(%)	
Rice Husk	Rp 19.200	4.800	60,0	Energy
Molasses	Rp 25.200	2.400	30,0	Energy
Urea	Rp 320	40	0,5	Nitrogen
Dolomite	Rp 120	120	1,5	Potassium, Magnesium
Mineral	Rp 1.400	200	2,5	Mineral
Salt	Rp. 400	200	2,5	Mineral
White Semen	Rp 600	120	1,5	Mineral
Probiotics/EM4	Rp 2.640	120	1,5	Protein
Amount	**Rp 49.880**	**8.000 (8 Kg)**	**100**	

The programme employs a communal approach to the production of fermented livestock feed, utilising a rotating system of two-day shifts per week, commencing in June. On each Thursday, the collection of pampas grass, odod, and biovitas from the leased Greenland pasture is conducted with the assistance of the CSR department of PT PLN IP Gunung Salak. The following materials were employed: a) 50 kg of biovitas grass, b) 50 kg of odod grass, c) 40 kg of cassava trees, d) molasses, e) 10 kg of aci kawung waste, f) 2 teaspoons of probiotics to replace EM4, g) a grass chopper, and, h) 50 and 120 litre drums.

Picture 6. Direct Practical Experience Conducted By Partners Under The Guidance Of The Team

The innovation in question has its origins at the system level. This innovation represents a solution for transforming traditional systems, which are perceived to be less effective, into semi-modern systems that can yield optimal results. This innovation transforms traditional farming systems, which previously relied solely on green feed, into more diverse and nutritionally balanced systems that can more effectively achieve desired outcomes. This is in accordance with the findings of Mucra and Azriani (2012), who stated that the integration of different sources of feed, whether as a primary or supplementary component, is a crucial factor in enhancing the success and productivity of animals, and consequently, the profitability of farming. From a nutritional standpoint, feed plays a pivotal role in supporting the fundamental needs of livestock, including growth, production, and reproduction (Maluyu et al., 2012).

The effectiveness of Elang Bodas programme was evaluated following trials of mineral blocks and fermented feed on six samples of sheep belonging to the Bina Mandiri Farmers Group in collaboration with BPP Kalapanunggal and Polbangtan Bogor. The observations made on the sheep indicated positive performance and palatability, as evidenced by the animals' demonstrated preference for the mineral blocks produced. During the course of the trial, the body weights of the sheep were recorded on a regular basis. The results demonstrated a statistically significant increase in weight, with an average gain of 6 kilograms over the 40-day period, in comparison to the control group.

Picture 7. The observations on the sheep over the 40-day period

The economic efficacy of the programme is evaluated based on the net present value (NPV) of the Mineral Block and Silage, which represents the increased profitability resulting from the increased weight of the livestock. The yield of the production process is 8 kilograms at a production cost of Rp 50,000. The recommended dosage for sheep is 50 grams per animal per day, which equates to 8 kilograms of mineral block over a 160-day period. Thus, the annual cost per sheep is determined to be Rp 114,000. The mean monthly weight gain is 4.5 kilograms, with an average market price of Rp 50,000 per kilogram of live sheep. Thus, the economic profit from the implementation of the mineral block and fermentation on an annual basis is calculated to be 4.5 x 12 x Rp. 50,000, which equates to Rp 2,700,000. This indicates that the net profit is Rp. 2,700,000 minus Rp. 1,000,000 (fermentation feed costs), equating to Rp. 1,700,000 per head per year. The following is a summary of the responses received from the programme's initial participants:

R = P x Q

= 50 sheep x Rp. 1,700,000

= Rp. 85,000,000 per annum

The influence of the programme on the efficacy of the assets can be gauged by reference to the following table.

Natural Resources	The derelict plot of land, which covers an area of 2000m², represents a significant challenge in terms of urban planning.	The asset in question is the property of one of the group's members and is currently being underutilised.	The use of these materials as the primary components of fermented feedstock for the cultivation of grasses such as odod, pakcong, and biovitas is a common practice in the field of agricultural production.	
Infrastructure.	The production centre for bioslurry and animal feed, which is owned by the farmer collective Bina Mandiri, represents a notable example of sustainable agricultural infrastructure.	The 200 m² plot of land on which the building is erected was donated by the group leader, while the central production facility for bioslurry and animal feed was provided by PT PLN IP Gunung Salak.	The site is employed for the manufacture of animal feed, the storage of fermented feedstocks and the training of production processes.	
Natural Resources and Waste Production.	The solid by-product of the production of round rice cakes is derived from the stems of the sugar palm.	Six households in the village of Pulosari are engaged in the production of bread shaped like aci kawungs.	Waste material that has previously been identified as an environmental issue can be processed into a valuable commodity, thereby serving as a substitute for grain in the	

			production of fermented feed and mineral blocks.	
Infrastructure and Facilities.	The former was a 120-litre tong and a grass-cutting machine for the production of fermented fodder.	The facilitation of corporate social responsibility (CSR) activities at PT PLN IP Gunung Salak represents a pivotal responsibility.	The by-product is employed in the manufacture of silage, which is used as livestock feed. .	

Moreover, the programme's impact on time efficiency is evident from the alterations in the time required for the provision of animal feed. The observational evidence collected during the programme implementation period indicates a shift in the pattern of small-scale livestock farmers' behaviour with regard to the sourcing of green fodder. This has evolved from an individual, ad hoc approach to a more collective and structured system, characterised by the rotation of tasks and the implementation of a schedule. Prior to the implementation of the programme, the average member of the group was observed to spend approximately four hours per day (28 hours per week) searching for green feed. Following the implementation of the programme, the average time spent by livestock producers on the provision of animal feed was reduced from four hours per day to 14 hours per week. This equates to a reduction of 28 hours per week per individual. The time was apportioned between the collection of forage (6 a.m. to 3 p.m. on weekdays) and the production of fermented feed (8 a.m. to 1 p.m. on Fridays).

Moreover, the programme has a positive impact on the environment. This is attributable to the utilisation of wheat bran waste as a primary material for the production of an alternative feedstuff. Prior to the implementation of the programme, the liquid and solid waste produced by the processing of wheat flour constituted a significant source of pollution in the river system. The term "waste" is defined as any substance or object that has lost its economic value and, consequently, has an adverse impact on the environment. Such substances or materials may be generated as a by-product of industrial production or domestic activities, or they may be produced naturally. In terms of its form, waste can be classified into three principal categories:

a. The term "solid waste" is used to describe a range of materials that are not liquid or gas and that are discarded from the production or consumption process. The term "solid waste" is defined as encompassing all forms of solid waste, including plastic waste, animal or human excrement, organic waste, and other similar materials.
b. The term "liquid waste" is used to describe a range of substances that are in a liquid state at room temperature. This category encompasses all forms of liquid waste, regardless of the source from which it originates. The term "liquid waste" is used to describe waste in a liquid form. Such waste includes wastewater from washing machines and liquid waste generated by industrial processes (Muliarta, 2019).

The remaining processing stages result in the generation of solid and liquid waste products. The solid waste produced is composed of residual pulp and fibre derived from the processing of aci

kawung starch. The composition of the palm oil waste, particularly the solid residue, is as follows: 69.59% C-organic, 0.74% NTK, 0.70% organic nitrogen, 1464.46 mg/kg phosphorus, 2206.96 mg/kg potassium, 0.04 mg/kg ammonia, and 635. The sample was found to contain 85 mg/kg magnesium, 652.23 mg/kg iron (Fe), 106.06 mg/kg zinc (Zn), 5.82 mg/kg copper (Cu), 487.67 mg/kg phosphorus, and 41.86 mg/kg manganese (Mn). Additionally, the moisture content was determined to be 71.72% of the sample's wet weight. The organic carbon content of palm ash is considerable, while the organic nitrogen content is relatively low at 0.70% (Firdayanti and Handajani, 2005).

The liquid waste product of the arenaceous flour processing operation is generated as a consequence of the grinding and extraction of starch from the fibre, in addition to the precipitation of arenaceous flour. The wastewater discharged by the arinaceous flour mill has a high Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), which has a significant adverse impact on the environment. In the majority of cases, the arin flour industry discharges liquid waste directly into water sources without undergoing preliminary treatment. The liquid waste generated during the pressing of arenga fibre to obtain arenga flour is referred to as arenga flour liquid waste. The generated waste exhibits elevated levels of biological oxygen demand (BOD5) and chemical oxygen demand (COD), exceeding the threshold limits for class II wastewater (BOD5 100 mg/l, COD 250 mg/l). The concentration of Biological Oxygen Demand (BOD5) ranges from 3000 to 7500 mg/l, while the concentration of Chemical Oxygen Demand (COD) ranges from 7000 to 30000 mg/l. Furthermore, the total suspended solids (TSS) concentration is notably high (1500-5000 mg/l), with a pH range of 4.0 to 6.5. The effluent displays a distinctive white-brown colouration, indicative of elevated dissolved solids concentration (Firdayanti & Handajani, 2005).

Picture 8. Evaluation Of The Impact/Effectiveness Of The Elang Bodas Programme

To date, the quality of the waste has been found to exceed the established standards for wastewater. The factors influencing the fractionation process in the production of alternative feed materials from carbohydrate-based waste include the C/N ratio of the waste materials, the size and composition of the individual waste particles, the presence and activity of functional microorganisms, temperature, aeration, and pH (Safitri et al.). The programme has resulted in a reduction of 1 ton per year in the contamination load of water produced during the production of aci kawung. The influence of the programme on the acquisition of knowledge and behavioural change was assessed by comparing the conduct of the trained farmers prior to and following the

implementation of the programme. The impact of the programme was evaluated using pre-test and post-test results, which were conducted after the programme's conclusion. The results demonstrate that the activities were effective in enhancing the knowledge and skills of 38 members of the Bina Mandiri Self-Sufficiency Group by 100%. An increase in knowledge was observed in the following areas: modern feed management, mineral block production and fermented feed production. Overall, 100% of the farmers exhibited comprehension of mineral block production following the training. This suggests that the activities were effective and met with a positive response from the farmers.

The extent to which the programme influences behavioural change is contingent upon the proportion of assisted farmers who are either willing or have already adopted the innovations introduced by the programme. The results demonstrate that the mineral block production and fermented feed programmes have been adopted by 20 of the 38 group members, who have implemented them on 50 sheep farms. This suggests that 52% of participants indicated a willingness to adopt the technology (mineral block) provided they had more leisure time. The reluctance of farmers to adopt this technology was attributed to their preference for direct involvement in the provision of livestock feed and their aversion to being burdened with additional technology (Wati et al., 2020).

CLOSING

Conclusion

The Elang Bodas Program represents a social innovation initiative spearheaded by CSR Community Empowerment of PT PLN Indonesia Power PLTP Gunung Salak UBP Kamojang Year 2024. The program's core objective is to enhance the efficiency and sustainability of the livestock sector in Pulosari Village. The innovation of this programme is evident at the system level. The efficacy of the programme is evidenced by a notable increase in livestock weight, with an average gain of 6 kilograms observed in the experimental group compared to the control group, which did not receive similar treatment. The economic effectiveness of the programme demonstrates an additional profit of Rp. 1,700,000 per head per year. The results demonstrate that the assets have been employed in an optimal manner throughout the implementation of the Elang Bodas programme. The time effectiveness of the programme can be observed in the alterations to the timeframes involved in the provision of animal feed. The environmental impact of the programme is evidenced by the utilisation of kawung aci waste as a raw material for the production of alternative mineral block feed, which has economic value. The programme has been observed to have a significant impact on the acquisition of knowledge and skills amongst the members of the Bina Mandiri Farmer Group, with an increase of 100% in the knowledge and abilities of 38 individuals. The impact of the programme on behavioural change demonstrated that 52% of participants exhibited a willingness to adopt the technology.

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