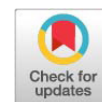


Research Article



Beyond Intrinsic Drive: The Role of External Support and Performance in Sustaining Pasundan Cattle Farming

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Abstract | Animal farming is highly demanded and preferred for maintaining stability in the food system. However, the problem is that nowadays fewer workers are interested in animal farming due to the high level of risks and sacrifices involved, especially in cattle farming. Meanwhile, Pasundan cattle are a type of local cattle characterized by low investment costs, high productivity, resilience, reproductive efficiency, and disease resistance. This study was conducted in West Java, Indonesia, during the last semester of 2025. It aims to determine how farmers' motivation and livestock farming performance influence the sustainability of Pasundan cattle farming. The study employed a survey method involving 160 respondents from four areas with the largest Pasundan cattle populations in West Java. Data were collected using structured questionnaires, and respondents were selected through purposive sampling based on the following criteria: owning and raising Pasundan cattle and being located in one of the selected areas. Four variables were analyzed in this study: intrinsic motivation, extrinsic motivation, livestock farming performance, and sustainability of animal farming. Correlation analysis indicates that both intrinsic and extrinsic motivation have positive and significant relationships with livestock farming performance, while farming performance shows a positive and significant relationship with farming sustainability. Extrinsic motivation also demonstrates a direct positive relationship with sustainability, although with relatively weak strength. In contrast, intrinsic motivation does not show a significant direct relationship with farming sustainability. Structural Equation Modeling (SEM) analysis reveals that the sustainability of Pasundan cattle farming is significantly influenced by livestock farming performance and supported by extrinsic motivation, whereas the direct contribution of intrinsic motivation is not statistically significant. Collectively, the three endogenous variables explain 22.1% of the variation in farming sustainability, which falls within a moderate level of explanatory power. These findings indicate that the determinants of success in Pasundan cattle farming are not always straightforward and may be influenced by local social, cultural, and economic dynamics.

Keywords | Pasundan cattle, Structural equation modeling (SEM), Rural farming systems, Sustainable beef cattle farming, Farmer motivation, Farming performance

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INTRODUCTION

The growing population has increased demand for animal protein in Indonesia, particularly beef. In 2024,

national consumption of beef and buffalo meat increased by 11.71% compared to 2023, reaching 759.67 thousand tons, while domestic production reached only 496,250 tons, resulting in a deficit of 263,420 tons (Central Bureau

of Statistics of Indonesia, 2024). This gap highlights the strategic importance of strengthening domestic livestock production to support national food security.

The livestock sector plays a strategic role in supporting food security, increasing rural household income, and conserving local genetic resources (Darmawan *et al.*, 2023; Yusdja and Winarso, 2009). One approach to achieving meat self-sufficiency is the optimization of high-yield local cattle breeds (Suhardi and Susilo, 2022; Widhyas *et al.*, 2022). Pasundan cattle, a local breed from West Java, represent an important genetic resource due to their adaptability to marginal environments and suitability for smallholder farming systems (Tawaf *et al.*, 2017). The existence of Pasundan cattle has been officially recognized by the government through the Minister of Agriculture Decree No. 1051/Kpts/SR.120/10/2014, Pasundan cattle are the result of long-term genetic adaptation involving *Bos sundaicus* and several Indonesian cattle breeds (Hadi *et al.*, 2022). They are characterized by a dominant brick-red body color, which in some males turns black at sexual maturity, white pelvic and lower leg areas, and a darker dorsal line (Suryaka *et al.*, 2024). The population of Pasundan cattle is primarily concentrated in West Java, including Pangandaran, Tasikmalaya, Ciamis, and Kuningan districts.

Despite this potential, the sustainability of Pasundan cattle farming remains under threat. Key challenges include low farmer regeneration, reliance on traditional production systems, and weak business performance (Munadi *et al.*, 2021). Livestock are often raised not as a primary business commodity but instead serve as a symbol of social status or a source of labor. In many cases, livestock are maintained as a secondary household activity rather than a commercial enterprise, limiting incentives for innovation and long-term development. As a result, the Pasundan cattle population declined by 21.96% between 2014 and 2017 (Arifin and Sulasmi, 2019), raising concerns about the future viability of the breed.

Global challenges such as climate change, environmental degradation, and socio-economic dynamics in rural areas represent sustainability issues in the livestock sector that require in-depth study (Figueroa *et al.*, 2025). A critical dimension of sustainability is farmer regeneration, defined as the continuity of actors, systems, and values across generations (Bilotto *et al.*, 2024). The development of local cattle depends heavily on farmers as the main actors in the production system (Khofiyah *et al.*, 2023). Previous studies emphasize that farmer motivation and performance are central determinants of livestock business sustainability (Kahfi *et al.*, 2022; Nurlina *et al.*, 2024).

Motivation drives farmers' commitment, while performance reflects their capacity to manage production efficiently

and adapt to changing conditions (Andarwati *et al.*, 2018; Heryadi *et al.*, 2022; Nurlina *et al.*, 2024). Farmers with higher performance levels tend to demonstrate stronger business orientation, openness to innovation, and greater resilience in market competition. Empirical evidence also indicates a positive relationship between farmer motivation and livestock business sustainability (Lutfhiana *et al.*, 2019).

However, in smallholder and subsistence farming systems, intrinsic motivation may differ from conventional entrepreneurial interpretations. Indicators such as achievement orientation, creativity, and managerial responsibility are often shaped by social, cultural, and institutional contexts, where livestock farming functions as a supplementary household activity rather than a primary business. Consequently, expectations regarding innovation and performance may be perceived differently by farmers. Therefore, understanding how internal motivations (work responsibility, cultural values, and job satisfaction) and farmer performance (skills, operational consistency, cooperative behavior, and on-farm creativity) contribute to the sustainability of Pasundan cattle farming is essential (Balzani and Hanlon, 2020; Maurer *et al.*, 2021; Sarie *et al.*, 2023).

This study therefore conceptualizes intrinsic motivation as a contextual construct embedded within the socio-economic conditions of Pasundan cattle smallholder farming. Accordingly, this study aims to analyze the effects of farmers' motivation and livestock farming performance on the sustainability of Pasundan cattle farming, thereby identifying the key factors influencing its long-term sustainability (Nurlina *et al.*, 2024). The findings are expected to provide a comprehensive understanding of factors that support or constrain the sustainability of smallholder livestock systems and to inform strategic efforts toward a more resilient and inclusive transformation of Pasundan cattle farming in Indonesia.

MATERIALS AND METHODS

RESEARCH OBJECTS AND SUBJECTS

The subjects of this study were Pasundan cattle farmers located in Kuningan, Ciamis, Pangandaran, and Tasikmalaya Regencies, which represent the main distribution areas of Pasundan cattle. The objects of this study consisted of farmer motivation (intrinsic and extrinsic motivation) and livestock farming performance as independent variables, and the sustainability of Pasundan cattle farming as the dependent variable.

RESEARCH LOCATION AND RESPONDENT SELECTION TECHNIQUE

This study was conducted from July to December 2025.

Research locations were selected using a purposive sampling approach in major Pasundan cattle development areas in Kuningan, Ciamis, Pangandaran, and Tasikmalaya Regencies. These regions represent the core distribution zones of Pasundan cattle in West Java.

Respondents were selected using a two-stage sampling technique. First, purposive sampling was applied to establish a sampling frame based on the following criteria: (1) owning at least one Pasundan cattle, (2) having more than two years of farming experience, and (3) being directly involved in farm decision-making. Second, simple random sampling was employed to select respondents who met these criteria. The sample size was determined using the Slovin formula. From an estimated population of 267 eligible farmers, a total of 160 respondents were selected using a 5% margin of error, proportionally distributed across the four regencies (40 respondents per regency).

DATA COLLECTION TECHNIQUES

Primary data were collected through structured interviews using a closed-ended questionnaire administered to Pasundan cattle farmers. The questionnaire covered three main components: (1) farmer motivation (intrinsic and extrinsic), (2) livestock farming performance, and (3) sustainability of Pasundan cattle farming. Secondary data were obtained from government reports, scientific publications, and official statistical documents, providing contextual information on Pasundan cattle development and regional livestock conditions.

VARIABLE OPERATIONALIZATION

This study employed independent variables consisting of farmer motivation and livestock farming performance, as well as a dependent variable, namely the sustainability of Pasundan cattle farming. The variables and indicators observed in this study is presented in Table 1. All variables were operationalized according to their conceptual definitions and adjusted to the context of smallholder Pasundan cattle farming.

FARMER MOTIVATION (X)

Farmer motivation was defined as the driving force that encourages farmers to engage in and sustain livestock farming activities (Alam *et al.*, 2014; Meryatun and Hasan, 2023). This variable consisted of intrinsic motivation (X1) and extrinsic motivation (X2).

- Intrinsic motivation (X1): Intrinsic motivation represented internal drivers originating from farmers themselves, including main livelihood orientation, success-oriented aspiration, cultural values, and work satisfaction.
- Extrinsic motivation (X2): Extrinsic motivation reflected external factors that supported farming

activities, including economic incentives, institutional support, participation in farmer groups, and market access.

Table 1: Variables and indicators observed in the study.

Variables	Indicators
Intrinsic motivation (X1)	
	Main Livelihood X1.1
	Success-Oriented Aspiration X1.2
	Work Satisfaction X1.3
	Cultural Value X1.4
Extrinsic motivation (X2)	
	Economic Incentives X2.1
	Institutional Support X2.2
	Farmers' Participation in Group X2.3
	Market Access X2.4
Livestock farming performance (X3)	
	Skills X3.1
	Operational Consistency X3.2
	Work Responsibility X3.3
	Cooperative Behavior X3.4
	On-Farm Creativity X3.5
Sustainability of animal farming (Y)	
	Livestock Population Y1
	Livestock Weight Gain Y2
	Farm Income Growth Y3

LIVESTOCK FARMING PERFORMANCE (X3)

Livestock farming performance referred to farmers' managerial behavior and work practices in managing Pasundan cattle farming. This variable was measured using indicators of skills, operational consistency, work responsibility, cooperative behavior, and on-farm creativity, which collectively reflected farmers' capacity to manage their farming enterprises effectively.

SUSTAINABILITY OF ANIMAL FARMING (Y)

The sustainability of Pasundan cattle farming was defined as outcome-based performance reflecting the continuity and viability of livestock farming activities. This variable was measured using indicators of livestock population growth, livestock weight gain, and farm income growth, representing productivity and economic performance over time.

RESEARCH INSTRUMENT TESTING

The research instrument was a closed-ended questionnaire using a three-point Likert scale. Prior to data collection, the instrument was tested for validity and reliability to ensure accurate and consistent measurement of the research variables. Content validity was assessed through

expert judgment involving academics and field extension officers, ensuring the relevance and appropriateness of each item to the measured constructs (Yusup, 2018). Reliability was evaluated using Cronbach's Alpha with SPSS, where a coefficient ≥ 0.7 indicated acceptable reliability.

All indicators were measured on an ordinal three-point Likert scale. The relationships among variables were analyzed using variance-based Partial Least Squares-Structural Equation Modeling (PLS-SEM) with SmartPLS, which is appropriate for ordinal data, does not require multivariate normality, and is suitable for predictive and exploratory research objectives.

ANALYTICAL METHODS

This study employed a mixed-methods approach using an explanatory sequential mixed-methods design (Creswell, 2013), in which quantitative data were collected and analyzed first, followed by qualitative interpretation to deepen the understanding of the quantitative results. The overall stages of the research process are illustrated in Figure 1. This study received ethical approval from the relevant Research Ethics Committee, and all respondents provided informed consent with guarantees of anonymity and data confidentiality.

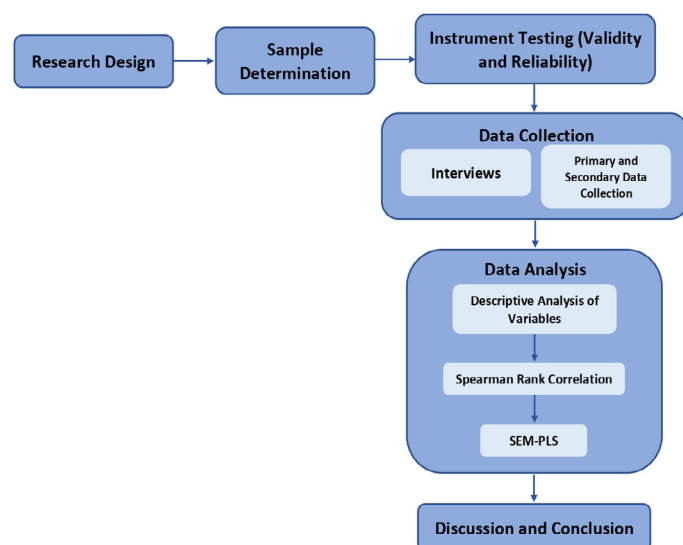


Figure 1: Research flow diagram.

Data analysis in this study was conducted through the following stages:

1. Instrument testing was conducted to ensure measurement quality, including content validity assessed through expert judgment and reliability testing using the Cronbach Alpha coefficient.
2. Descriptive analysis was used to describe the general conditions of farmers motivation, livestock farming performance, and farm sustainability without examining inter-variable relationships (Santoso *et al.*, 2025). This step provided an initial overview of data distribution

prior to inferential analysis. Interval class analysis was conducted by calculating total variable scores derived from the sum of indicator scores for each respondent. The interval ranges and categorical classifications for each variable are presented in Table 2.

3. Spearman Rank correlation analysis was applied to examine the strength and direction of bivariate relationships among the research variables.
4. Structural Equation Modeling-Partial Least Squares (SEM-PLS) was employed to support theory development in this exploratory study with a relatively small sample size (Santoso *et al.*, 2025). The analysis was conducted using SmartPLS software, which is robust to non-normal data and ordinal-scale indicator (Santoso *et al.*, 2025; Wong, 2013). SEM-PLS was used to examine relationships among latent variables and to identify dominant indicators influencing the sustainability of Pasundan cattle farming. Measurement model evaluation included outer loadings, internal reliability, and construct validity. Negative loadings observed in several intrinsic motivation indicators were interpreted as reflecting farmers' social context and business orientation rather than model misspecification.
5. Measurement model re-evaluation was conducted by reassessing outer loadings, internal consistency, and construct validity to ensure that negative loadings did not indicate systematic measurement errors.

Table 2: Determination of interval classes for research variables.

No	Variables	Interval	Category
1	Intrinsic Motivation (X1)	3.00 – 5.00	Low
		5.01 – 7.00	Moderate
		7.01 – 9.00	High
2	Extrinsic Motivation (X2)	4.00 – 6.67	Low
		6.68 – 9.33	Moderate
		9.34 – 12.00	High
3	Livestock Farming Performance (X3)	5.00 – 8.33	Low
		8.34 – 11.67	Moderate
		11.68 – 15.00	High
4	Sustainability of Animal Farming (Y)	3.00 – 5.00	Low
		5.01 – 7.00	Moderate
		7.01 – 9.00	High

RESULTS AND DISCUSSIONS

FARMER CHARACTERISTICS

The regulation on the categorization of productive working age in Indonesia was regulated under Labor Law No. 13 of 2003, which distinguished young/non-productive age (≤ 14 years), working/productive age (15–64 years), and non-productive age (> 65 years) (Indonesia, 2003). As shown

in Table 3, most respondents fell within the productive age category but were concentrated in older age groups. Advanced age contributed positively to accumulated experience and husbandry skills; however, it also tended to limit innovation capacity, technology adoption, creativity, and physical endurance (Seok *et al.*, 2018; Setiyowati *et al.*, 2022). This age structure indicates a regeneration gap that may weaken adaptive capacity and poses a long-term risk to the sustainability of Pasundan cattle farming.

Table 3: Characteristics of Pasundan cattle farmers respondents.

Characteristics	Number of farmers (n=160)	Percentage (%)
Age		
15 – 64 years	121	75.60
> 64 years	39	24.40
Formal education Level		
No formal education	16	10.00
Elementary school	100	62.50
Junior High School	32	20.00
Senior High School	7	4.38
Higher Education	5	3.12
Non-formal education		
Extension/ lectures/ training	70	43.75
Extension and training	90	56.25
Farming Experience		
<10 years	17	10.62
10 – 20 years	93	58.13
>20 years	50	31.25
Main Occupation		
Farmer	70	43.75
Non Farmer	90	56.25
Number of Pasundan cattle owned		
≤ 2 heads	109	68.12
3 – 5 heads	24	15.00
>5 heads	27	16.88
Farming Purpose		
Breeding	145	91.00
Fattening	3	2.00
Breeding and Fattening	12	7.00
Membership in farmer groups		
Member	133	83.12
Non-Member	27	16.88
Land size		
<0.025 ha	20	12.50
0.025 – 0.5 ha	75	46.88
>0.5 ha	65	40.62
Gender		
Male	144	90.00
Female	16	10.00

The education level of farmers was relatively low, with elementary school graduates dominating the sample (62.50%). Education influenced knowledge, managerial ability, and the quality of decision-making in farming enterprises (Listiana *et al.*, 2020). Nevertheless, within small-scale rural systems, farming experience, social learning, and non-formal education often compensate for limited formal schooling (Lestari, 2019; Widayati *et al.*, 2024). Even so, empirical evidence consistently shows that higher formal education facilitates technology adoption and the implementation of efficient and sustainable farming practices (Demera *et al.*, 2024; Zanon *et al.*, 2024). Thus, education remains a structural factor influencing the pace of modernization in livestock systems.

Given the structural nature of low formal education, capacity-building strategies must prioritize practical, experience-based learning approaches. The relatively high participation of farmers in non-formal education highlights the continued relevance of extension services as an effective mechanism for improving farmer capacity (Makatita *et al.*, 2014). Along with the dynamic changes in livestock production systems, farmers were required to possess adequate knowledge, skills, and attitudes to adapt effectively (Sugiarto *et al.*, 2019, 2025; Yiran and Stringer, 2016). More intensive engagement in extension activities enhances opportunities to translate knowledge into improved performance and sustainability outcomes.

Most farmers had long farming experience, reflecting maturity in practice and a strong understanding of local production conditions. This experiential capital supported business resilience, particularly in overcoming technical and environmental constraints, although management practices remained largely traditional (Sundari *et al.*, 2009). With improved access to information and institutional support, such experience can serve as a foundation for transitioning toward more modern and sustainable management systems (Syafira *et al.*, 2023; Yunasaf *et al.*, 2024).

Pasundan cattle farming still primarily functioned as a secondary occupation, as indicated by 56.25% of farmers who had primary jobs outside livestock farming. This reduced time allocation and managerial focus, thereby constraining business growth and long-term sustainability. Similar patterns have been reported by Amam *et al.* (2024), who found that beef cattle farming in Indonesia is often treated as a side activity, with small herd sizes and livestock serving primarily as household savings rather than productive assets.

The secondary nature of livestock farming was reflected in small herd ownership, with most farmers keeping ≤2 head of cattle. Such limited scale restricts production capacity, capital accumulation, and technical efficiency,

increasing vulnerability and reducing sustainability prospects. Woodhouse (2010) similarly noted that small-scale livestock enterprises tend to generate lower income and net returns due to reduced productivity and economic efficiency.

Therefore, efforts to enhance sustainability through herd expansion must be accompanied by improvements in time commitment, managerial capacity, and institutional support. Institutional mechanisms are particularly important in facilitating access to feed resources, capital, innovation, and collective management (Simamora, 2020). In this context, the high proportion of farmers participating in farmer groups (83.12%) represents valuable social capital that can support gradual scaling-up and management improvement.

The small operational scale was also associated with a production pattern dominated by breeding activities, which require relatively low capital, involve longer production cycles, and demand less intensive management. This pattern aligns with smallholder constraints and the biological characteristics of Pasundan cattle as a local genetic resource, but it limits opportunities for value addition through fattening systems. From a resource perspective, land ownership was relatively adequate, with most farmers owning more than 0.025 ha. This indicates latent potential for forage provision and cost efficiency, which could support scale expansion if accompanied by sufficient motivation and institutional facilitation.

Pasundan cattle farming was still predominantly managed by men (90%), reflecting socio-cultural norms that associate livestock activities with physical labor and position men as primary income earners (Santoso and Kususiyah, 2015). However, increasing women's involvement particularly in decision-making and group-based activities may strengthen sustainability outcomes. Previous studies suggest that women's participation in agriculture is often linked to stronger care-oriented values and environmental responsibility (Hill, 2009; Nadhira and Sumarti, 2017; Tourtelier *et al.*, 2023). Expanding gender-inclusive participation therefore represents an underutilized pathway for enhancing sustainable livestock development.

FARMERS MOTIVATION IN PASUNDAN CATTLE FARMING

Motivation functioned as a key driving force shaping farmers engagement in farm management, decision-making, and adaptive capacity. In this study, motivation was distinguished into intrinsic and extrinsic dimensions, reflecting internal values and satisfaction versus external stimuli such as economic incentives, policy support, and market access. This conceptual distinction aligns with Sanjaya and Suparta (2019) and Rasoki *et al.* (2017), who emphasized that farmers' actions are directed by both

internal psychological forces and external conditions.

Table 4: Farmers motivation in Pasundan cattle farming.

Research variable	Code	Category (% of respondents)		
		Low	Moderate	High
Intrinsic motivation	X1	10.00	42.50	47.50
Extrinsic motivation	X2	15.00	52.50	32.50

The results presented in Table 4 showed that farmers' intrinsic motivation was classified in the high category (47.50%), reflected in success-oriented aspiration, cultural value, and work satisfaction in raising Pasundan cattle. This finding suggests that farmers motivation was not purely economic, but strongly embedded in social and cultural contexts. As a local genetic resource, Pasundan cattle carried symbolic and cultural meaning, encouraging farmers to maintain livestock even when it did not constitute their primary livelihood. Similar patterns were reported by Fitriani *et al.* (2020) among Pasundan cattle farmers in Tasikmalaya Regency and by Collado *et al.* (2015), who found that farmers' preferences were often driven by intrinsic livestock characteristics rather than production performance alone.

High intrinsic motivation was reinforced by personal satisfaction derived from daily husbandry activities, pride in preserving local genetic resources, and adherence to inherited farming traditions. Comparable conditions were observed among beef cattle farmers in Southwest Maluku, where livestock farming was sustained by enjoyment and emotional attachment rather than economic returns alone (Haumahu *et al.*, 2020). From a theoretical perspective, such intrinsic motivation can strengthen long-term sustainability, as farmers' commitment is grounded in internal values rather than short-term incentives (Nurlina *et al.*, 2024). Practically, this implies that development programs emphasizing cultural identity, farmer autonomy, and local wisdom such as livestock competitions and participatory training may be effective in reinforcing sustainable management behavior.

In contrast, extrinsic motivation among Pasundan cattle farmers was generally moderate (52.50%) and primarily associated with economic incentives, government programs, market access, feed availability, and extension support. This moderate level reflected field realities in which Pasundan cattle farming had not yet become the main livelihood, resulting in limited financial returns and uneven access to external support. Weak market governance and limited bargaining power further constrained the motivational impact of external stimuli, as previously noted by Tawaf (2017), who stated that marketing access for Pasundan cattle was relatively ineffective because farmers lacked the capacity to market their products directly, transaction

patterns were still based on estimated live weight systems, and payment systems were dominated by credit arrangements, thereby weakening farmers' bargaining positions.

These findings indicate that while extrinsic motivational factors were present, they were not sufficiently strong or consistent to generate higher business commitment. Therefore, strengthening extrinsic motivation through coherent operational policies, institutional support, and continuous technical assistance is essential to enhance farmer performance and sustainability (Maulana *et al.*, 2021). Policy implications include improving access to tailored microfinance, strengthening farmer groups and cooperatives, enhancing price transparency, and ensuring equitable extension services. Such interventions are expected to complement strong intrinsic motivation and support the long-term sustainability of Pasundan cattle farming systems.

LIVESTOCK FARMING PERFORMANCE IN PASUNDAN CATTLE FARMING

Livestock farming performance reflected farmers effectiveness in managing Pasundan cattle and was assessed through skills, operational consistency, cooperative behavior, and on-farm creativity (Nurlina *et al.*, 2024). As shown in Table 5, overall farming performance was classified in the high category (55.50%), indicating that most farmers possessed basic managerial and technical capacities supporting farm operation.

Table 5: Livestock farming performance in Pasundan cattle farming.

Research variable	Code	Category (% of Respondents)		
		Low	Moderate	High
Livestock farming performance	X3	2.50	42.50	55.00

High performance was closely associated with farmers' long practical experience, with most respondents having more than ten years of involvement in cattle farming. Such experience enhanced farmers ability to address husbandry constraints and maintain business continuity, consistent with Aziz *et al.* (2020), who emphasized experience as a key asset in sustaining livestock enterprises. Routine management practices, including regular feeding schedules and daily animal care, were generally well implemented, reflecting adequate operational consistency (Maulana *et al.*, 2021). Previous studies have shown that perseverance and dedication, particularly when accompanied by openness to innovation, contribute positively to livestock business sustainability (Artananda *et al.*, 2025).

Despite relatively strong basic performance, Pasundan cattle

farming remained dominated by traditional management systems, with limited technology adoption. This condition constrained gains in productivity and efficiency, suggesting that high performance was largely driven by experience-based practices rather than technological advancement. However, the relatively high level of farmer group participation provided a favorable institutional foundation for improvement, as these groups facilitated information exchange, collective action, and access to development programs.

From a practical perspective, strengthening institutional roles emerged as a critical strategy for enhancing performance and sustainability. Institutional support is essential for coordinating incentives, facilitating interaction among stakeholders, and accelerating technology diffusion in small-scale livestock systems. A study by Avalos *et al.* (2024) on dairy and beef cattle farming in Costa Rica demonstrated that institution-led, community-based learning such as farmer field schools and demonstration farms effectively improved technology adoption and innovation. Accordingly, similar institutional interventions could help transform experience-based performance into more efficient and sustainable Pasundan cattle farming systems.

SUSTAINABILITY OF PASUNDAN CATTLE FARMING

The sustainability of animal farming reflected farmers' ability to maintain and develop their livestock enterprises over the long term (Hadi *et al.*, 2022). In this study, sustainability was assessed through livestock population, livestock weight gain, and farm income growth. As shown in Table 6, the sustainability level was classified as high (83.75%), indicating relatively strong business continuity and resilience.

Table 6: Sustainability of Pasundan cattle farming.

Research variable	Code	Category (% of Respondents)		
		Low	Moderate	High
Sustainability of animal farming	Y	5.00	26.25	68.75

Although the adoption of feed technology and production management had not yet been optimal, routine and disciplined husbandry practices such as providing feed at relatively consistent times and monitoring livestock conditions were still able to support livestock weight gain. This condition reflected farmers basic skills and field experience played an important role in maintaining livestock production performance.

Sustainability was most strongly reflected in livestock population maintenance. Most farmers retained breeding cows and calves, indicating an orientation toward herd

regeneration rather than short-term profit maximization. Pasundan cattle functioned as productive assets or living savings, providing economic flexibility when sales were conducted to meet household needs. This low-intensity selling pattern reduced financial pressure, as production costs were minimized through the use of local feed resources, family labor, and simple management systems. Tawaf (2017) similarly reported that farmers perceived Pasundan cattle farming as profitable because implicit costs were rarely accounted for and sales were need-based rather than market-driven.

However, this condition primarily reflected a survival-oriented sustainability rather than growth-oriented business development. While enterprises were able to persist, their capacity for income expansion and competitiveness remained limited. From a practical perspective, economic sustainability needs to be strengthened through targeted interventions that support business upgrading and value enhancement in small-scale beef cattle systems (Simamora et al., 2024). Programs such as the Pasundan cattle grant scheme demonstrated potential to increase farmers' income in the medium term through structured breeding systems, particularly via calf sales at the post-weaning stage (Fitriani et al., 2020). These findings underline the importance of aligning sustainability strategies not only with continuity but also with gradual business development.

CORRELATION BETWEEN MOTIVATION, LIVESTOCK FARMING PERFORMANCE, AND SUSTAINABILITY OF ANIMAL FARMING AMONG PASUNDAN CATTLE FARMERS

The validity test indicated that the indicator "Main Livelihood" did not align with the underlying construct and was therefore excluded from the model. The remaining indicators demonstrated significant correlations with their respective constructs, confirming their adequacy

in representing farmers' motivational and behavioral dimensions.

Spearman Rank correlation analysis (Table 7) revealed that intrinsic motivation (X1) was positively and significantly correlated with extrinsic motivation (X2) ($r = 0.524$; $p < 0.01$), suggesting that farmers with strong internal drive were also responsive to external stimuli such as government programs, incentives, and market access. Intrinsic motivation was also positively correlated with livestock farming performance (X3) ($r = 0.447$; $p < 0.01$), indicating that internal motivation supported consistency in farm management practices (Greiner and Gregg, 2011). However, intrinsic motivation showed no significant direct correlation with sustainability of animal farming (Y) ($r = 0.099$; $p > 0.05$), implying that internal drive alone was insufficient to directly enhance sustainability outcomes under traditional and low-technology farming conditions.

Extrinsic motivation (X2) exhibited positive and significant correlations with livestock farming performance (X3) ($r = 0.499$; $p < 0.01$) and sustainability (Y) ($r = 0.160$; $p < 0.05$), although the latter relationship was relatively weak. This finding suggested that external support contributed to sustainability, but its effect remained limited due to uneven access and suboptimal implementation (Swami and Parthasarathy, 2024).

Livestock farming performance (X3) was positively and significantly correlated with sustainability (Y) ($r = 0.329$; $p < 0.01$), indicating that improvements in skills, discipline, cooperation, and management effectiveness were directly associated with higher sustainability levels. Overall, these results suggest that livestock farming performance functioned as a key mediating variable linking farmers' motivation to sustainability outcomes,

Table 7: Correlation between motivation, livestock farming performance, and sustainability of animal farming.

Spearman's rho		X1	X2	X3	Y
X1	Correlation coefficient	1.000	0.524**	0.447**	0.099
	Sig. (2-tailed)	.	0.000	0.000	0.213
	N	160	160	160	160
X2	Correlation coefficient	0.524**	1.000	0.499**	0.160*
	Sig. (2-tailed)	0.000	.	0.000	0.043
	N	160	160	160	160
X3	Correlation coefficient	0.399**	0.495**	1.000	0.329**
	Sig. (2-tailed)	0.000	0.000	.	0.000
	N	160	160	160	160
Y	Correlation coefficient	0.099	0.160*	0.329**	1.000
	Sig. (2-tailed)	0.213	0.043	0.000	.
	N	160	160	160	160

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

where motivated farmers tended to translate their drive into improved management practices rather than directly into sustainability gains (Nurlina *et al.*, 2024).

SEM-PLS ANALYSIS OF MOTIVATION, LIVESTOCK FARMING PERFORMANCE, AND SUSTAINABILITY OF ANIMAL FARMING AMONG PASUNDAN CATTLE FARMERS

SEM-PLS was used to develop theory in exploratory research aimed at explaining variance in dependent variables (Hair *et al.*, 2017). In this study, SEM-PLS was applied to examine the direct and indirect effects of farmers' motivation and livestock farming performance on the sustainability of Pasundan cattle farming. The structural relationships among constructs are illustrated in Figure 2, which shows the pathways linking intrinsic motivation, extrinsic motivation, livestock farming performance, and sustainability of animal farming.

The SEM measurement model in Figure 2 indicated that several indicators had low or negative weights, including work satisfaction (-0.676), farmers' participation in group (-0.211), on-farm creativity (-0.010), and work responsibility (-0.131). These negative loadings did

not necessarily indicate measurement error, but rather reflected the empirical context of small-scale smallholder farming. Under conditions of limited resources, high risk, and structural constraints, attributes such as achievement orientation, creativity, responsibility, and participation tended to manifest as perseverance in maintaining existing farming practices, even when these practices were not always efficient. Thus, the relationship between motivational characteristics and performance was contextual and not always linear.

The indicators work responsibility and farmers' participation in group reflected farmers' persistence in managing livestock amid limited resources; however, such persistence did not automatically translate into effective farming outcomes. The livestock farming performance construct in this study represented the effectiveness of farming outcomes rather than merely the intensity of involvement. These findings highlight the importance of developing measurement instruments that are more sensitive to the specific conditions of smallholder livestock systems.

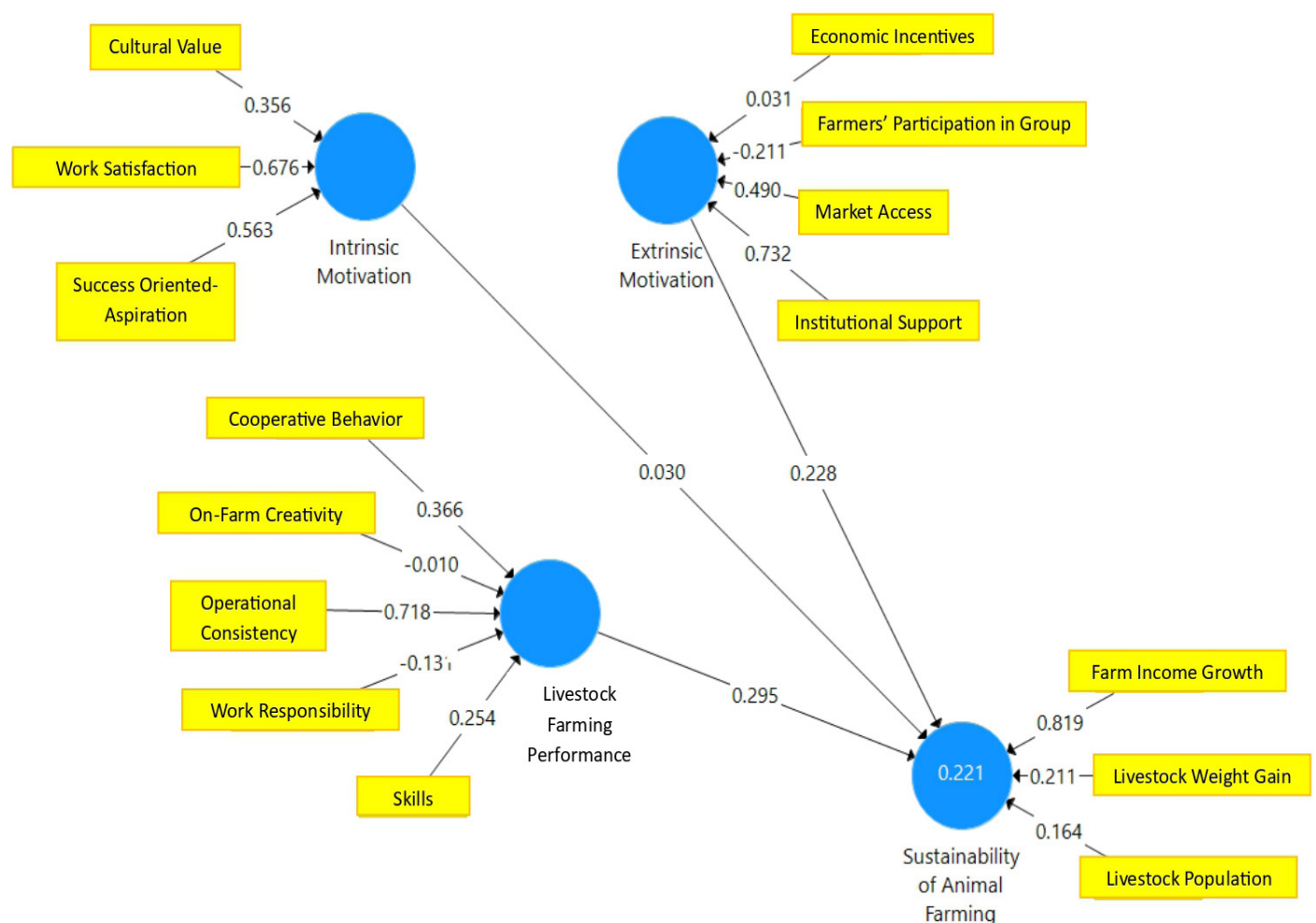


Figure 2: SEM-PLS diagram of motivation, livestock farming performance, and sustainability of Pasundan cattle business.

For the sustainability construct, farm income growth showed the strongest contribution (0.819), while livestock weight gain (0.211) and livestock population (0.164) contributed more modestly. This pattern indicates that sustainability in this study was more strongly reflected as social and economic sustainability rather than biological sustainability. Similar results were reported by [Setiadi *et al.* \(2021\)](#), who found that social factors played a more prominent role in beef cattle farming sustainability under small-scale rural conditions, where biological performance tended to be relatively homogeneous due to the use of local breeds and limited reproductive technologies.

The structural paths in [Figure 2](#) showed relatively weak coefficients. Intrinsic motivation had almost no direct effect on sustainability (0.030; $p > 0.05$), while extrinsic motivation (0.228) and livestock farming performance (0.295) had moderate positive effects. These findings indicate that intrinsic motivation operated mainly through indirect pathways, particularly via livestock farming performance. In smallholder systems, capability-based performance which reflected in skills, discipline, cooperation, creativity, and responsibility functioned as an operational foundation linking motivation to actual farming outcomes.

The coefficient of determination value ($R^2 = 0.221$) indicated that the model explained only 22.1% of the variation in sustainability of animal farming, implying that approximately 78% of the influencing factors remained outside the model as residual variance. The Variance Inflation Factor values ($VIF < 3.3$) confirmed the absence of multicollinearity, indicating stable relationships among variables. This result reflects the complexity of sustainability of animal farming in West Java, which is shaped by intertwined social, economic, and environmental factors. Variables not included in the model likely involve access to capital, market price stability, supply chain efficiency, and institutional and policy support, such as microcredit availability, government subsidies, price fluctuations, and the role of middlemen.

Environmental and resource constraints further influenced sustainability outcomes. Pasundan cattle farming was often conducted on marginal land or integrated with other farming activities, while natural feed quality particularly grass protein content was frequently insufficient to support optimal growth and animal health. In addition, genetic quality, breeding standards, and access to animal health services and vaccination played an important role. These findings emphasize that sustainability of animal farming depends not only on human capital, but also on capital availability, policy support, and natural resource conditions. Accordingly, future research should incorporate indicators related to institutional support, market stability, resource

access (land, water, and feed), and technical and animal health services.

Path coefficient results ([Table 8](#)) confirmed that livestock farming performance ($\beta = 0.295$; $T = 2.980$; $p = 0.003$) and extrinsic motivation ($\beta = 0.228$; $T = 2.386$; $p = 0.017$) had positive and significant effects on sustainability, whereas intrinsic motivation showed no significant direct effect ($\beta = 0.030$; $T = 0.304$; $p = 0.761$). These findings are consistent with ([Fauziyah *et al.*, 2017](#)), who show that personal characteristics do not directly affect performance; however, when combined with technical competence, they can enhance beef cattle farming performance.

Table 8: Path coefficient.

Path coefficient	Coefficient	T statistics	P values
Livestock farming performance -> Sustainability of animal farming	0.295	2.980	0.003
Extrinsic motivation -> Sustainability of animal farming	0.228	2.386	0.017
Intrinsic motivation -> Sustainability of animal farming	0.030	0.304	0.761

In the Pasundan cattle farming system, which was integrated with rice farming and operated traditionally, the space for creative behavior remained limited. Farming success was more strongly determined by inherited practices than by innovation. Similar patterns were observed among Jabres cattle farmers in Central Java, where deviations from established practices were perceived as socially risky ([Santoso *et al.*, 2025](#)). Although farmers creativity was conceptually important, this study found that it had not yet translated into measurable improvements in sustainability indicators, such as livestock population, body weight gain, and income. In smallholder systems, creativity tended to take the form of small-scale adaptive practices such as local feed adjustments, simple barn modifications, and daily risk management which functioned more to stabilize and enhance resilience than to drive short-term production or income gains.

Accordingly, future studies are encouraged to refine the measurement of creativity by focusing on implemented innovations or by examining its mediating role through variables such as knowledge acquisition and technology adoption. Within traditional Pasundan cattle farming systems, compliance with established norms and perseverance remained the primary drivers of farming performance, while innovation had not yet assumed a dominant role.

The work responsibility indicator also showed a negative weight, reflecting systemic limitations. High perseverance

and discipline did not automatically result in better performance without adequate support in the form of quality feed, animal health services, livestock genetics, and market access. The findings of Rohaeni *et al.* (2024) on beef cattle farming sustainability in Kalimantan stated that external variables, including government agencies, institutions, and academic institutions working in synergy, influenced sustainability.

Overall, the SEM results indicate that the most reliable pathway toward sustainability operates through improvements in tangible livestock farming performance, particularly reproduction, mortality reduction, and feed efficiency. Extrinsic motivation through economic incentives, government assistance, access to credit, and institutional support emerged as the primary driving force, while intrinsic motivation, on-farm creativity, and work responsibility were insufficient to function optimally without adequate system support. Similar patterns have been observed among beef cattle farmers in East Java who utilized credit financing to expand farm scale and improve feed quality (Mahendri *et al.*, 2016), as well as among agricultural cooperatives in Nepal that provided financial and marketing support to protect farmers from monopolistic practices (Neupane *et al.*, 2022).

These findings emphasize that livestock development strategies cannot rely solely on farmers' internal motivation, but must be supported by resources, technology, and strong institutions to translate positive behaviors into sustainable outcomes. Accordingly, intervention efforts should prioritize improving technical skills, adopting need-based technologies, and strengthening economic, social, and environmental sustainability indicators (Fauziyah *et al.*, 2017). These efforts are expected to support the sustainability of Pasundan cattle as a local genetic resource integrated within the agricultural systems of West Java.

CONCLUSIONS AND RECOMMENDATIONS

The primary constraints faced by Pasundan cattle farmers are systemic and technological rather than individual. While cultural motivation plays an important role in sustaining farmers persistence and social continuity, it is insufficient to ensure sustainability of animal farming without adequate institutional and technological support. Therefore, development efforts should shift toward creating enabling conditions that allow farmers' perseverance to be translated into stable income and long-term sustainability. Farmers' creativity mainly functions as an adaptive mechanism at the micro level and has not yet been fully captured by aggregate sustainability indicators, indicating that the moderate R^2 value reflects the inherent

complexity of smallholder livestock systems rather than a limitation of the analytical model. Future research should therefore adopt sustainability metrics that are more sensitive to process innovation, feed-use efficiency, and resource management.

From a practical perspective, sustainability can be strengthened through improved access to technology, including subsidized concentrate feeds or collective input procurement facilitated by cooperatives, training on feed formulation using local resources, and the expansion of artificial insemination services and routine pregnancy checks to support herd growth. Policy performance indicators should prioritize tangible outcomes such as increases in farmers' net income, reductions in livestock mortality, and improvements in animal health rather than focusing solely on farmer characteristics. Institutional strengthening should be emphasized through the functional roles of farmer groups and cooperatives as channels for input distribution, animal health and reproductive services, and collective marketing, thereby enhancing farmers' bargaining power and reducing structural constraints without requiring fundamental institutional transformation.

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NOVELTY STATEMENT

This study provides new empirical evidence that the sustainability of local cattle farming is not determined solely by farmers intrinsic motivation and cultural commitment, but is strongly shaped by farming system capacity and external institutional and economic support that enable motivation to be translated into tangible performance and sustainability outcomes. By integrating farmers' motivation, livestock farming performance, and sustainability using an SEM-PLS approach in a smallholder Pasundan cattle context, this study offers a replicable analytical framework applicable to other rural local cattle systems with similar constraints.

AUTHOR'S CONTRIBUTION

MS: Conceptualization, data curation, formal analysis, writing original draft, writing review and editing,

supervision, resources. AF: Conceptualization, data curation, methodology, formal analysis, writing original draft, writing review and editing, supervision, resources. AF: Conceptualization, validation, supervision, writing review and editing. UY: Conceptualization, validation, supervision, writing review and editing. LN: Conceptualization, validation, supervision, writing review and editing. SA: Conceptualization, validation, supervision, writing review and editing. MAM: Conceptualization, validation, supervision, writing review and editing. KNS: Data curation, formal analysis, writing original draft, writing review and editing, resources.

GENERATIVE AI AND AI-ASSISTED TECHNOLOGY STATEMENT

The authors declare that no generative AI or AI-assisted technologies were used to generate, analyze, or interpret the research data. Generative AI tools were used only to assist in checking grammar, language clarity, and readability of the manuscript during the revision process. All scientific content, interpretations, and conclusions remain the full responsibility of the authors.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

REFERENCES

- Alam A, Dwijatmiko, Sumekar W (2014). Farmers motivation to activities of beef cattle livestock at Buru Regency Maluku Province. *Agromedia*, 32(2): 75–89.
- Amam A, Luthfi M, Prihatin KW, Jihadhan T (2024). Driving factors for sustainable livestock development in indonesia: study on beef cattle commodities. *BIO Web Conf.*, 88(0031). <https://doi.org/10.1051/bioconf/20248800031>
- Andarwati S, Haryadi T, Guntoro B, Sulastri E, Putra RARS, Gunawan G (2018). Relationship between farmer's characteristics with the motivation of goat milking in the girikerto village turi district sleman regency. *Bull. Petern.*, 42(3): 256–261. <https://doi.org/10.21059/buletinpeternak.v42i3.32771>
- Arifin J, Sulasmi (2019). Genetic distance of pasundan cattle through craniometric approach between Pangandaran, Tasikmalaya, and Garut Areas of West Java. *Jurnal Ternak*, 10(1): 12–17. <https://doi.org/10.30736/jy.v10i1.36>
- Artananda WY, Nurhidayati I, Khomah, I (2025). The effect of self-efficacy, motivation, and business knowledge on Millennial Farmers' business success. *IOP Conf. Ser. Eath Environ. Sci.*, 1497. <https://doi.org/10.1088/1755-1315/1497/1/012026>
- Avalos I, Sepulveda C, Betanzos JE, Trujillo JAJ, Sanches EP, Escobedo A (2024). Institutional arrangements in the promotion of sustainable livestock: An approach from the case of beef and dairy cattle production. *Front. Sustain. Food Sys.*, 8(1310507). <https://doi.org/10.3389/fsufs.2024.1310507>
- Aziz GA, Kartawan, Rahmat B (2020). Factors affecting the performance of people's dairy cattle development in

- pagerageung Subdistrict, Tasikmalaya Regency. *Agribus. Syst. Sci. J.*, 1(1): 15–29.
- Balzani A, Hanlon A (2020). Factors that influence farmers' views on farm animal welfare: A semi-systematic review and thematic analysis. *Animals*, 10(9): 1524. <https://doi.org/10.3390/ani10091524>
- Bilotto F, Harrison MT, Vibart R, Mackay A, Christie-Whitehead KM, Ferreira CSS, Cottrell RS, Forster D, Chang J (2024). Towards resilient, inclusive, sustainable livestock farming systems. *Trends Food Sci. Technol.*, 152: 104668. <https://doi.org/10.1016/j.tifs.2024.104668>
- Central Bureau of Statistics of Indonesia (2024). Animal husbandry in numbers 2024.
- Collado DM, Byrne, TJ, Amer PR, Santos BFS, Axford M, Pryce JS (2015). Analyzing the heterogeneity of farmers preferences for improvements in dairy cow traits using farmer typologies. *J. Dairy Sci.*, 98(6): 4148–4161. <https://doi.org/10.3168/jds.2014-9194>
- Creswell JW (2013). *Research design: Qualitative, quantitative, and mixed methods approaches*. 4th Edition. Sage Publications, Inc.
- Darmawan H, Chang HL, Wu HH (2023). A community-based breeding program as a genetic resource management strategy of indonesian ongole cattle. *Sustainability*, 15(7): 6013. <https://doi.org/10.3390/su15076013>
- Demera MHD, Gamboa LV, Alcivar ERZ, Gavilanes MPZ, Loor LEV, Rauschemberg MKL, Izurieta COL, Andrade JIM, Palacios CAC, Rodriguez EGM (2024). Impact of the educational level of the owners on the implementation of good livestock practices on selected farms. *J. Anim. Behav. Biometeorol.*, 12(4): 2024027. <https://doi.org/10.31893/jabb.2024027>
- Fauziyah D, Nurmalina R, Burhanuddin B (2017). The influence of farmer characteristics through farmer competence on the performance of beef cattle farming businesses in Bandung regency. *J. Agribisnis Indonesia*, 3(2): 83. <https://doi.org/10.29244/jai.2015.3.2.83-96>
- Figueroa D, Galicia L, Foucat VSA, Morales BD (2025). Applying the socio-ecological systems framework to assess the sustainability of tropical cattle ranching in Mexico. *Front. Sustain. Food Syst.*, 8. <https://doi.org/10.3389/fsufs.2024.1446965>
- Fitriani A, Herlina L, Sulistyati M, Yunasaf U, Sulaeman MM (2020). Farmers preference, attitude, satisfaction, and loyalty in raising pasundan beef cattle in Tasikmalaya District, West Java. *J. Petern. Indones.*, 22(2): 155–167. <https://doi.org/10.25077/jpi.22.2.155-167.2020>
- Greiner R, Gregg D (2011). Farmers intrinsic motivations, barriers to the adoption of conservation practices and effectiveness of policy instruments: Empirical evidence from northern Australia. *Lans Use Policy*, 28(1): 258–265. <https://doi.org/10.1016/j.landusepol.2010.06.006>
- Hadi AR, Yunasaf U, Fitriani A (2022). Relationship between group dynamics and business sustainability of pasundan cattle farm (case of pasundan cattle farmer group in Tegal Waru Village, Tegalwaru District, Purwakarta Regency. *J. Sos. Bisnis Petern.*, 4(2): 38–44. <https://doi.org/10.24198/jsbp.v4i2.41507>
- Hair JF, Hult GTM, Ringle CM, Sarstedt M (2017). *A primer on partial least squares structural equation modeling (SEM-PLS)*. 2nd edition. Sage.
- Haumahu N, Tomatala GSJ, Ririmase PM (2020). The motivation of cattle farmers towards beef cattle business in Moa Island,

- Southwest Maluku Regency. *J. Pertan. Kepulauan*, 4(2): 55–68.
- Heryadi ZA, Mauludin MA, Nurlina L (2022). The effect of motivation on employee performance in beef cattle farming beef cattle (Case at the Company PT. Kadila Lestari Jaya District Cikancung, Bandung Regency). *J. Sos. Bisnis Petern.*, 4(1): 22–29. <https://doi.org/10.24198/jsbp.v4i1.42262>
- Hill CI (2009). Gender in agriculture. International Fund for Agricultural Development.
- Indonesia (2003). Law number 13 of 2003 concerning Labor.
- Kahfi MAN, Amam A, Rusdiana S, NakhmaUssolikah (2022). The influence of dairy farmers' human resources on sustainable farming development. *Mimbar Agribisnis*, 8(2): 785. <https://doi.org/10.25157/ma.v8i2.7328>
- Khofiyah MN, Fitriani A, Firman A (2023). The influence of farmers' socioeconomic characteristics and livestock farming management on the income of pasundan cattle farmers (Case Study in Cibingbin Subdistrict, Kuningan Regency). *J. Sos. Bis. Petern.*, 5(1): 36–44.
- Lestari M (2019). The relationship between parenting styles and children's independence. *J. Pendidikan Anak*, 8(1): 84–90. <https://doi.org/10.21831/jpa.v8i1.26777>
- Listiana I, Rangga KK, Anggoroseto P, Purwatiningsih NA (2020). Farmers responses to the use of combine harvesters during rice harvesting in Pringsewu District, Lampung Province. *Pengkajian Dan Pengembangan Teknologi Pertanian*, 23(3): 259–269. <https://repository.pertanian.go.id/handle/123456789/13523>
- Lutfhiana MR, Mauludin A, Nurlina L (2019). The correlation between motivation of female farmer and business sustainability of dairy farm (The Case of Female Dairy Farmer Member of KSU Karya Nugraha Cipari Sub-District, Cigugur District, Kuningan Regency). *J. Sos. Bis. Peternakan*, 1(1): 1–10. <http://jurnal.unpad.ac.id/jbsp/v1i1.25490>
- Mahendri IGAP, Waldron S, Wegener M, Cramb RA (2016). A comparison of cattle fattening system with and without credit in two districts in East Java, Indonesia. *Proceedings of the 17th Asian-Australasian Association of Animal Production Societies Animal Science Congress*, pp. 197–201.
- Makatita J, Isbandi, Dwidjatmiko S (2014). The level effectiveness method extension development beef cattle in buru regency maluku provincy. *Agromedia*, 32(2): 94–105.
- Maulana I, Munandar M, Sulistyati M (2021). Relation of characteristic farmers with motivation of pasundan cattle business. *J. Sos. Bis. Petern.*, 3(2): 66–73. <https://doi.org/10.24198/jsbp.v3i2.50273>
- Maurer L, Schenkenfelder J, Winkler C (2021). Resource, collaborator, or individual cow? Applying Q methodology to investigate austrian farmers' viewpoints on motivational aspects of improving animal welfare. *Front. Vet. Sci.*, 7: 1–14. <https://doi.org/10.3389/fvets.2020.607925>
- Meryatun M, Hasan F (2023). Farmers' motivation in raising Sonok cattle in Dempo Barat Village, Pasean District, Pamekasan Regency. *Agriscience*, 4(1): 83–95. <https://journal.trunojoyo.ac.id/agriscience>
- Munadi L, Hafid H, Zulkarnain D, Pujian SRR (2021). Motivation of bali cattle farmers tinanggea and palangga subdistrict South Konawe Regency. *Int. J. Sci. Technol. Manage.*, 2(3): 737–746. <https://doi.org/10.46729/ijstm.v2i3.195>
- Nadhira VF, Sumarti T (2017). Gender analysis in livestock business and their relation to the household income of. *J. Sains Komunikasi Dan Pengembangan Masyarakat*, 1(2): 129–142. <https://doi.org/10.29244/jskpm.1.2.129-142>
- Neupane H, Paudel KP, Adhikari M, He Q (2022). Impact of cooperative membership on production efficiency of smallholder goat farmers in Nepal. *Ann. Publ. Cooper. Econ.*, 93(2): 337–356. <https://doi.org/10.1111/apce.12371>
- Nurlina L, Alim S, Faranita D, Mauludin MA, Sulistyati M, Yunasaf U (2024). Motivation and performance of farmers relationship with the sustainability of dairy farming business. *Mimbar Agribisnis*, 10(2): 3308–3316. <https://doi.org/10.25157/ma.v10i2.14752>
- Rasoki MYM, Cepriadi, Kausar (2017). Analysis the effect of motivation to plasma broiler breeders through the partnership (contract farming) in the city of Pekanbaru. *JOM Faperta*, 4(2).
- Rohaeni ES, Ilham N, Saptati RA, Rahayu HS, Priyono, Anggraeny YN, Qomariah R, Pamungkas D, Ermuna SS, Mahendri IGAP, Mariyono, Darsani YR, Hutahaeen L, Praptana RH, Lesmayati S, Ahmad SN, Bahar S, Suhartini SH, Santoso AD, Rakhmani SIW (2024). Developing a sustainable beef cattle business model for smallholder farms in South Kalimantan's Drylands. *Int. J. Sustain. Dev. Plann.*, 19(2): 481–500. <https://doi.org/10.18280/ijstdp.190207>
- Sanjaya IGAMP, Suparta N (2019). Farmers motivation to raising cow on bali cattle breeding business (Case Study at Pelaga Village, Petang District, Badung Regency). *IOP Conf. Ser. Earth Environ. Sci.*, 012124. <https://doi.org/10.1088/1755-1315/347/1/012124>
- Santoso FA, Muatip K, Cahyo DN, Safitri L, Sugiarto M, Lana DL (2025). SEM-PLS analysis of farmers efforts to improve environmental quality in the Jabres cattle breeding center. *J. Ilmiah Petern. Halu Oleo*, 7(1): 30–39. <https://doi.org/10.56625/jpho.v7i1.31>
- Santoso U, Kususiayah (2015). Women's contribution and status in livestock farming Sapi Potong. *J. Sain Peternakan Indones.*, 10(1): 32–43. <https://doi.org/10.31186/jspi.id.10.1.32-43>
- Sarie F, Mohammad W, Jamin NS, Ramlan W (2023). The influence of demographic factors, farmer knowledge, and motivational factors on the adoption of agricultural technology innovation: A case study on dairy farmers in South Bangka. *West Sci. Agro*, 1(1): 28–35. <https://doi.org/10.58812/wsa.v1i01.374>
- Seok JH, Moon H, Kim G, Reed MR (2018). Is aging the important factor for sustainable agricultural development in Korea? Evidence from the relationship between aging and farm technical efficiency. *Sustainability*, 10(7): 2137. <https://doi.org/10.3390/su10072137>
- Setiadi A, Nurdiansyah A, Gayatri S, Santoso SI, Nurfadillah S, Prayoga K, Mariyono J, Nuswantara LK (2021). Beef cattle sustainability determinants using structural equation modeling in Pati Regency, Central Java. *Agriekonomika*, 10(2). <https://doi.org/10.21107/agriekonomika.v10i2.10813>
- Setiyowati T, Fatchiya A, Amanah S (2022). The influence of farmer characteristics on knowledge of clove cultivation innovation in East Halmahera Regency. *J. Penyuluhan*, 18(2): 208–218. <https://doi.org/10.25015/18202239038>
- Simamora T (2020). Improving farmer competence and the sustainability of beef cattle farming in Oebkim Village, South Bikomi District, North Central Timor Regency. *Agrimor*, 5(2): 20–23. <https://doi.org/10.32938/ag.v5i2.1007>

- Simamora T, Rofiq MN, Hutahaean L, Sio S, Hutapea R, Irawan D, Suryani, Diastuti R, Thiyas UN, Correia BA, Correia LT (2024). Sustainability index for eco-friendly cattle farming in dry climate regions. *Glob. J. Environ. Sci. Manage.*, 10: 279–302.
- Sugiarto M, Wakhdiati YN, Aunurrohman H (2019). Farmers satisfaction of the service quality of broiler contract farming model in banyumas regency. *Bull. Petern.*, 43(3): 207–212. <https://doi.org/10.21059/buletinpeternak.v43i3.44853>
- Sugiarto M, Wakhidati YN, Gandasari D (2025). The competence of agricultural extension workers in empowering beef cattle farmers in Banjarnegara Regency. *J. Penyuluhan*, 21(1): 182–195. <https://doi.org/10.25015/21202552492>
- Suhardi DA, Susilo A (2022). Livestock self-sufficiency and livestock household distribution in Indonesia: Current state and expected developments. *J. Agribis.*, 1(1).
- Sundari A, Rejeki, Triatmaja H (2009). Analysis of beef cattle farmers' income from intensive and conventional husbandry systems in Sleman Regency, Yogyakarta. *Sains Peternakan*, 7(2): 73–79. <https://doi.org/10.20961/sainspet.7.2.73-79>
- Suryaka Y, Sutopo S, Setiaji A (2024). The phenotypic characteristics and morphology of Jabres and Pasundan cattle differences. *Biodiversitas*, 25(7): 3239–3246. <https://doi.org/10.13057/biodiv/d250745>
- Swami D, Parthasarathy D (2024). Role of intrinsic motivation and government policies in adoption of sustainable agriculture practices by farmers in Maharashtra, India. *Farm. Syst.*, 2(3): 100100. <https://doi.org/10.1016/j.farsys.2024.100100>
- Syafira LE, Fitriani A, Herlina L (2023). The effect of farmers characteristics on the income level of pasundan cattle farming (Survey in Tambaksari Subdistrict, Ciamis Regency). *J. Sos. Bisnis Peternakan*, 5(1): 20–28.
- Tawaf R (2017). Characteristic of pasundan cattle farming in west java. *Jurnal Nukleus Peternakan*, 4(1): 95–101.
- Tawaf R, Paturochman M, Herlina L, Sulistyati M, Fitriani A (2017). The optimation of farmers families' revenue the integration of Pasundan cattle and paddy farming in West Java. *J. Indones. Trop. Anim. Agric.*, 42(4): 270–278. <https://doi.org/10.14710/jitaa.42.4.270-278>
- Tourtelier C, Gorman M, Tracy S (2023). Influence of gender on the development of sustainable agriculture in France. *J. Rural Stud.*, 101: 103068. <https://doi.org/10.1016/j.jrurstud.2023.103068>
- Widayati O, Purwanta, Rayar HZ (2024). Improving farmers' knowledge of biosecurity implementation in layer chickens in Aimasi Village, Aimasi District, Manokwari Regency. *Prosiding Seminar Nasional Pembangunan Dan Pendidikan Vokasi Pertanian Politeknik Pembangunan Pertanian Manokwari*, 5(1): 461–477. <https://doi.org/10.47687/snppvp.v5i1.1129>
- Widyas N, Widi TSM, Prastowo S, Sumantri I, Hayes BJ, Burrow HM (2022). Promoting sustainable utilization and genetic improvement of indonesian local beef cattle breeds: A review. *Agriculture*, 12(10): 1566. <https://doi.org/10.3390/agriculture12101566>
- Wong KKK (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Market. Bull.*, 24: 1–32.
- Woodhouse P (2010). Beyond industrial agriculture? Some questions about farm size, productivity and sustainability. *J. Agrar. Change*, 10(3): 437–453. <https://doi.org/10.1111/j.1471-0366.2010.00278.x>
- Yiran GAB, Stringer LC (2016). Spatio-temporal analyses of impacts of multiple climatic hazards in a savannah ecosystem of Ghana. *Clim. Risk Manage.*, 14: 11–26. <https://doi.org/10.1016/j.crm.2016.09.003>
- Yunasaf U, Alim S, Rahayu D (2024). Farmers' perceptions of the sustainability of beef cattle farming (Case Study in Kondangajar Village, Cijulang Subdistrict, Pangandaran Regency, West Java). *Mimbar Agribisnis*, 10(2): 2642–2651. <https://doi.org/10.25157/ma.v10i2.14319>
- Yusdja Y, Winarso B (2009). Socioeconomic development policy towards the desired livestock system. *Analisis Kebijakan Pertanian*, 7(3): 269–282.
- Yusup F (2018). Testing the validity and reliability of quantitative research instruments. *J. Tarbiyah Jurnal Ilmiah Kependidikan*, 7(1): 17–23. <https://doi.org/10.18592/tarbiyah.v7i1.2100>
- Zanon T, Alrhoun M, Gauly M (2024). Assessing the impact of biosecurity practices and animal welfare in small-scale mountain dairy farming. *Sci. Rep.*, 14(1): 1–14. <https://doi.org/10.1038/s41598-024-63841-y>