Relationships Between Management Practices and Production Performance among Smallholder Goat Raisers in Ilocos Norte

Labador, Joan P

Master of Science in Agriculture major in Animal Science. Graduate School, Ilocos Sur Polytechnic State College, Santa Maria Campus, Sta. Maria, Ilocos Sur

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ABSTRACT

This study assessed the production performance and management practices of smallholder goat raisers in Ilocos Norte. Specifically, it described the respondents' socio-demographic characteristics, management practices, production systems, production performance, and problems and constraints encountered in goat raising. It also examined the relationships between selected socio-demographic characteristics and management practices, management practices and production performance, and production systems and management practices. A descriptive-correlational research design was employed, involving 420 goat raisers selected through proportionate stratified random sampling from eight municipalities and two cities in Ilocos Norte. Data were gathered using a researcher-made questionnaire and analyzed using frequency, percentage, weighted mean, and correlation analysis.

The findings showed that most respondents maintained small herds, had more than ten years of farming experience, and had not attended goat-raising seminars or training. Among the six management domains, housing practices obtained the highest mean, while record keeping obtained the lowest. The intensive production system was the most commonly practiced. Selected socio-demographic characteristics were significantly associated with certain management practice domains. However, no statistically significant relationships were established between the six management practice domains and overall production performance. Only two significant associations were found between production systems and management practices: tethering and housing, and intensive production and breeding practices. Furthermore, the problems and constraints encountered by the respondents were rated as serious to very serious. These findings highlight the need to strengthen practical training, sustainable feed and forage production, breeding management, preventive animal health care, marketing practices, and systematic record keeping. Proposed management and policy interventions were developed to address the identified gaps and constraints and to support the efficiency and sustainability of smallholder goat production in Ilocos Norte.

Keywords: goat production, management practices, production performance, production systems, smallholder goat raisers

INTRODUCTION

Background of the Study

Globally, smallholder goat production systems vary widely from extensive pastoral and agro-pastoral systems to semi-intensive backyard units and emerging small-scale commercial farms. These systems differ in herd size, production objectives (meat, milk, or dual-purpose), feeding strategies (grazing versus cut-and-carry), and integration with crop farming. Understanding these systems is essential for designing relevant interventions and extension programs (Sow et al., 2021).

In the Philippines, goat production is largely managed by backyard or small-scale farmers operating in low-input systems that rely heavily on crop residues, native forages, and other locally available feed resources. This approach makes goat raising especially suitable for marginalized communities and households with limited capital, where maintaining larger livestock may not be feasible (Department of Agriculture, 2022). Goats contribute significantly to household livelihoods by providing meat and milk and serving as a readily marketable asset that supports income generation and food security.

According to the Philippine Statistics Authority (2024), goat production continues to grow in certain regions. The Ilocos Region alone recorded 2,357 metric tons of liveweight production in the fourth quarter of 2024, an increase of 2.4% compared to the same period in 2023. The national goat industry remains dominated by backyard producers, who comprise more than 99% of the total herd. These raisers generally depend on crop by-products, natural forage, and locally sourced feeds to sustain their animals.

Despite the growing importance of goats in rural livelihoods, productivity in smallholder settings remains low. Traditional and low-input management practices such as uncontrolled breeding, inadequate feeding, poor housing, and limited veterinary access continue to hinder growth and reproductive performance. These constraints often result in low kidding rates and high mortality. Dela Cruz et al. (2025) emphasized the need for targeted research and development, particularly as demand for chevon and goat dairy products continues to rise.

Ilocos Norte is a province situated in the Ilocos Region in the northern section of Luzon. Laoag City serves as its provincial capital and is located near the delta of the Laoag River. Geographically, the province is bordered by Cagayan to the northeast, Abra to the east, Ilocos Sur to the south, and the West Philippine Sea along its northern and western boundaries. Administratively, Ilocos Norte is composed of two legislative districts. Agriculture remains a major source of livelihood in the province, with a significant portion of the population engaged in crop farming and livestock production, including smallholder goat raising.

According to records from the Provincial Veterinary Office (PVET), the total goat population in Ilocos Norte as of 2025 reached 80,611 heads distributed across the different municipalities of the province. The data show that the City of Batac recorded the highest goat population with 9,777 heads, followed by Pasuquin with 8,471 and Laoag City with 6,478 goats, respectively. Other municipalities with relatively large goat populations include Pinili (5,624), Vintar (5,478), Badoc (4,978), Dingras (4,928), and Sarrat (4,578). Meanwhile, moderate goat populations were observed in Paoay (3,987), Marcos (3,874), San Nicolas (2,947), Burgos (2,915), Banna (2,714), and Currimao (2,487). Smaller populations were noted in Bacarra (2,158), Solsona (2,012), Nueva Era (1,987), Piddig (1,901), Bangui (1,687), and Pagudpud (1,114). The municipalities with the lowest goat populations were Carasi (294), Adams (125), and Dumalneg (97).

Despite the growing importance of goat production as a livelihood activity in Ilocos Norte, limited empirical studies have examined the relationship between goat management practices, production systems, and productivity performance among smallholder raisers in the province.

Most available data focus primarily on population counts rather than examining the management practices, production outputs, and operational constraints experienced by goat farmers. This gap highlights the need for a comprehensive assessment of goat production systems and management practices in Ilocos Norte. Understanding how smallholder farmers manage breeding, feeding, housing, health, marketing, and record-keeping practices is essential in determining the factors that influence productivity and sustainability of goat production systems.

Therefore, this study aims to assess the production performance and management practices among smallholder goat raisers in Ilocos Norte to generate evidence-based information that can guide policy interventions and extension programs for improving goat production in the province.

Framework of The Study

Understanding the factors that influence the productivity of smallholder livestock systems requires a theoretical perspective that integrates farmer characteristics, management practices, institutional support mechanisms, and

environmental conditions. In the context of smallholder goat production, productivity outcomes are rarely determined by a single factor; rather, they emerge from the interaction between socioeconomic resources, technological adoption, and institutional support structures. To explain these interactions, this study draws on four complementary theoretical perspectives: the Sustainable Livelihoods Framework, the Agricultural Innovation Systems perspective, the Climate-Smart Agriculture framework, and the Diffusion of Innovations Theory. These perspectives collectively provide a comprehensive analytical basis for examining how management practices influence production performance among smallholder goat raisers in Ilocos Norte.

Sustainable Livelihoods Framework

The Sustainable Livelihoods Framework (SLF) provides an important lens for understanding how rural households utilize available resources to sustain agricultural production and improve their well-being. Originally developed within rural development studies, the framework has been widely used in agricultural research to analyze the strategies employed by smallholder farmers in managing livelihood activities. The SLF proposes that household livelihood outcomes are shaped by the combination of assets available to individuals and the broader institutional and environmental contexts in which they operate.

Within the framework, five categories of livelihood assets are typically identified: human, natural, financial, social, and physical capital. Human capital includes knowledge, education, technical skills, and farming experience that enable individuals to manage agricultural enterprises effectively. Natural capital refers to the availability and quality of natural resources such as land, pasture areas, water sources, and vegetation that support livestock production. Financial capital includes access to income, savings, credit, or other financial resources that allow farmers to invest in farm inputs and livestock management. Social capital encompasses networks, farmer associations, and relationships with institutions that facilitate cooperation and information exchange among farmers. Physical capital includes infrastructure and production facilities such as livestock housing, equipment, transportation systems, and access to markets.

The framework also emphasizes the role of institutional and policy environments in shaping livelihood strategies. Government support programs, agricultural extension services, veterinary services, and market opportunities can significantly influence farmers' capacity to adopt improved livestock management practices. Within the context of Ilocos Norte, institutional support provided by local government units, agricultural offices, and livestock development programs may help farmers improve goat production systems and overcome common constraints associated with smallholder livestock production.

Thus, the Sustainable Livelihoods Framework provides a useful theoretical basis for examining how the socio-economic characteristics of goat raisers, combined with the resources available to them, influence their management practices and ultimately affect production performance.

Agricultural Innovation Systems Perspective

The Agricultural Innovation Systems (AIS) perspective complements the Sustainable Livelihoods Framework by emphasizing the role of knowledge exchange and institutional collaboration in promoting agricultural development. Unlike earlier models that viewed innovation as a linear process of technology transfer from researchers to farmers, the AIS perspective recognizes that agricultural innovation emerges from complex interactions among multiple actors within the agricultural system.

These actors include farmers, researchers, extension agents, government institutions, private sector organizations, and market participants. Through continuous interaction and knowledge sharing, these actors collectively contribute to the development, adaptation, and dissemination of improved agricultural technologies and practices.

In livestock production systems, innovation may involve the introduction of improved breeding strategies, efficient feeding systems, disease prevention techniques, better housing designs, and improved marketing

approaches. However, the successful adoption of such innovations often depends on farmers' access to information, training opportunities, and institutional support networks.

The AIS perspective therefore highlights the Importance of strengthening institutional linkages and knowledge networks that support livestock development. In areas where farmers have greater access to extension services, training programs, and institutional support, the adoption of improved management practices tends to be higher, leading to improved production performance. Conversely, limited access to technical information and weak institutional support can restrict farmers' ability to adopt innovations and improve productivity.

Climate-Smart Agriculture Framework

The Climate-Smart Agriculture (CSA) framework provides another important perspective for understanding sustainable livestock production in the context of environmental variability and climate change. CSA emphasizes agricultural practices that simultaneously pursue three interrelated objectives: increasing agricultural productivity, enhancing resilience to climate variability, and promoting environmentally sustainable production systems.

Livestock production systems, particularly small ruminant production, play an important role in building climate resilience among rural households. Goats are often considered a resilient livestock species because they can survive under relatively harsh environmental conditions and are capable of utilizing diverse forage resources. As a result, goat production has become an important livelihood strategy for smallholder farmers in many rural areas.

However, achieving sustainable productivity in goat production requires appropriate management practices. Feeding strategies, housing design, disease prevention measures, and breeding management all influence the overall productivity and sustainability of goat production systems. Climate-smart livestock management practices may include improved forage production, rotational grazing systems, proper housing ventilation, efficient manure management, and preventive veterinary care.

In the context of Ilocos Norte, where agricultural activities are influenced by seasonal variations in rainfall and forage availability, climate-responsive management practices are particularly important. Implementing sustainable feeding systems and improving animal health management can help farmers maintain productivity while adapting to changing environmental conditions. By promoting efficient and resilient livestock management practices, the CSA framework provides guidance for developing sustainable goat production systems that support long-term rural livelihoods.

Taken together, these theoretical perspectives provide a comprehensive foundation for analyzing smallholder goat production systems. The Sustainable Livelihoods Framework explains how farmers' resources and socio-economic characteristics shape their livelihood strategies. The Agricultural Innovation Systems perspective highlights the role of institutional support and knowledge networks in promoting innovation adoption. The Climate-Smart Agriculture framework emphasizes the importance of sustainable and resilient livestock management practices.

By integrating these theoretical perspectives, the study recognizes that goat production performance is influenced by the dynamic interaction between farmer characteristics, management practices, institutional support systems, environmental conditions, and innovation adoption processes. These theoretical foundations guide the present study in examining how management practices and production systems affect productivity among smallholder goat raisers in Ilocos Norte and in identifying policy interventions that may enhance the sustainability and efficiency of smallholder goat production systems.

Statement of the Problem

This study aimed to assess the production performance and management practices among smallholder goat raisers in Ilocos Norte.

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Specifically, the study was conducted in the municipalities of Badoc, Dingras, Marcos, Paoay, Pasuquin, Pinili, Sarrat, and Vintar, as well as Batac City and Laoag City, in Ilocos Norte. The respondents consisted of 420 smallholder goat raisers who were actively engaged in goat production as part of their livelihood. The study was conducted during the 2025–2026 research period.

Specifically, the study sought to answer the following questions:

1. What is the socio-demographic profile of smallholder goat raisers in terms of:

a. age

b. sex

c. civil status

d. educational attainment

e. years of farming experience and skills

f. access to extension services

g. income from goat raising

h. primary source of income and livelihood

i. monthly income

j. herd size

k. land holding size

l. source of foundation stock

m. current goat breeds raised

n. membership in a livestock organization

2. Management practices refer to the routine activities and procedures performed by smallholder goat raisers in maintaining and managing their animals. In this study, management practices were assessed through six major domains:

Breeding Management – includes breeding-stock selection, controlled mating, prevention of inbreeding, nutritional care of pregnant does, and appropriate breeding procedures.

Feeding Management – includes the provision of adequate feed and water, forage utilization, supplementation, rotational grazing, and feed conservation.

Housing Management – includes the provision of appropriate shelter, ventilation, flooring, sanitation, disinfection, and manure management.

Health Management – includes deworming, vaccination, disease prevention, isolation of sick animals, veterinary consultation, and health monitoring.

Marketing Management – includes coordination with buyers, pricing practices, timing of sales, market participation, and access to reliable markets.

Record-Keeping – includes documentation of breeding activities, kidding records, animal growth, feed availability, health treatments, and mortality.

3. Is there a significant relationship between socio-demographic profile and management practices?

4. What type of production systems are being practiced (tethering, extensive, intensive, semi-intensive)?

5. In this study, production performance refers to the production-related indicators used to describe the reproductive, growth, survival, and marketing outcomes of smallholder goat-raising operations. Specifically, it was assessed in terms of the following:

Initial Weight – refers to the initial or birth weight of goat kids as reported by the respondents.

Kid Size (Litter Size) – refers to the number of kids delivered by a doe during one kidding.

Survival Rate – refers to the percentage of goat kids that survive during the period considered in the study.

Approximate Weight at Three Months Old – refers to the reported body weight of goat kids at approximately three months of age.

Months Before Selling – refers to the period or age of goats before they are sold.

Average Selling Price – refers to the reported average price received by raisers for each goat sold.

6. What is the relationship between:

a. management practices and production performances

b. production systems and management practices

7. What are the major problems and constraints encountered by smallholder goat raisers in management practices and production performance?

8. Based on the findings, what management and policy interventions can be proposed to improve efficiency and sustainability of smallholder goat production systems?

Scope and Delimitation of the Study

To this study, smallholder goat raisers refer to individuals in Ilocos Norte who own or manage small-scale goat-raising operations consisting of one (1) to thirty-five (35) goats. They must have at least one (1) year of experience in goat raising and must be directly involved in the daily management and care of their animals, including breeding, feeding, housing, sanitation, and health management. Only eligible goat raisers officially registered with the Provincial Veterinary Office (PVET) were included in the study. Commercial-scale goat farms were excluded because of differences in production scale, capital investment, technology, and management systems.

REVIEW OF RELATED LITERATURE

Socio-demographic Profile of Smallholder Goat Raisers

Age constitutes a pivotal socio-demographic determinant that shapes farmer engagement in agricultural

undertakings, including smallholder goat production. Individuals across distinct age cohorts exhibit divergent levels of practical experience, physical capability, knowledge acquisition, and propensity to adopt enhanced agricultural technologies. In their investigation characterizing smallholder goat production systems and evaluating management practices toward dairying in Central Luzon, Philippines, Orden et al. (2023) established that the majority of smallholder goat farmers 74% of respondents fell within the 31–60 years age bracket, indicating that goat production is predominantly pursued during the prime productive years of adulthood.

Concordantly, Delmonte et al. (2023) observed that goat farming in Negros Occidental was dominated by older producers, with respondents aged 50 years and above representing the largest segment, while younger participation remained comparatively limited. Collectively, these studies confirm that goat raising engages individuals across the lifespan, though sustained participation appears strongly associated with accumulated farming experience and generational livelihood orientation.

Sex functions as a salient variable in livestock agriculture, as men and women often assume distinct roles within management regimes and household livelihood systems. In a study examining gender dimensions of goat production in Negros Occidental, Delmonte et al. (2023) reported that 57.6% of producers identified as male and 42.4% as female, evidencing substantial participation by both sexes. However, the scope of involvement differed by gender. Female producers were primarily engaged in breeding activities, whereas male producers tended to focus on meat production.

Civil status represents another influential socio-demographic factor governing engagement in agricultural and livestock enterprises. Married producers may derive distinct advantages from household-level cooperation and shared labor in farm operations. According to Orden et al. (2023), approximately 82% of smallholder goat farmers surveyed in Central Luzon were married, suggesting that goat production is frequently embedded within family-based livelihood structures that leverage collective household labor.

Corroborating this pattern, Delmonte et al. (2023) found that 81.9% of backyard goat raisers in Negros Occidental were married. In smallholder systems, family participation facilitates essential husbandry tasks including feeding, sanitation, and health monitoring thereby supporting the continuity of livestock operations.

Formal educational attainment influences producers' capacity to comprehend, assess, and implement recommended livestock management protocols. Higher educational attainment typically correlates with improved access to agricultural information, receptivity to training initiatives, and ability to deploy modern production technologies. Tongol et al. (2023), in their analysis of backyard goat management practices in Negros Occidental, documented the educational profiles of producers and affirmed the relevance of educational background as a conditioning variable in production practice adoption.

Likewise, Orden et al. (2023) examined educational attainment alongside production practices among Central Luzon producers, noting persistent reliance on traditional methods despite respondents' educational profiles. This observation highlights the necessity of aligning agricultural extension and education interventions with producers' technical proficiency and contextual circumstances.

Duration of farming experience serves as a key indicator of accumulated practical expertise in husbandry, including feeding, breeding, housing, disease control, and stock selection. Orden et al. (2023) recorded an average of 19 years of engagement in goat farming among Central Luzon respondents, denoting substantial tenure within the enterprise. Notably, however, extensive experience did not correlate with widespread adoption of improved production practices. While references such as Santos et al. (2023) may provide additional insight into experiential knowledge systems upon full verification, findings from Orden et al. (2023) demonstrate that long-standing practical familiarity must be complemented by contemporary technical training to realize productivity gains.

Participation in formal training and extension programs is instrumental in advancing producers' technical proficiency across domains including nutrition, reproduction, housing, disease prevention, and farm administration. A Philippine-based investigation titled Implication of Farmers' Motivation in Attending Farmer

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Livestock School in Their Behavioural Change in Goat Production and Management Practices evaluated the Farmer Livestock School for Integrated Goat Management and documented a 129% increase in knowledge among participants following program completion. Educational attainment, cooperative engagement, and prior training exposure were identified as significant predictors of knowledge acquisition.

These results affirm that structured capacity-building interventions drive both knowledge enhancement and behavioral adoption of improved husbandry practices. Complementarily, Orden et al. (2023) advocate for context-appropriate, evidence-based extension programming to address technical limitations in smallholder operations, particularly among producers with limited formal agricultural education.

Goat farming constitutes a supplementary livelihood strategy that contributes to household financial resilience through diverse revenue streams including the sale of live animals, breeding stock, meat, and derived products. Orden et al. (2023) identified income generation as the primary motivation for engagement among approximately 70% of Central Luzon respondents; nevertheless, the reported mean annual contribution from goat raising was ₱19,200, confirming its role principally as a complementary rather than primary income source.

Consistent with this, Paguia et al. (2020), in their study of community-based diversified farming systems in Bataan, Philippines, found that integrating goat production with rice cultivation and vermicomposting improved farm profitability and generated additional income for participating farmers. These findings highlight goat raising as a valuable supplementary economic activity that can strengthen household income and support the livelihood sustainability of smallholder farmers.

Producers' principal livelihood orientation shapes resource allocation including time, capital, and land toward goat production. Most smallholder households pursue multiple income-generating activities to diversify economic risk. Orden et al. (2023) reported that 47% of Central Luzon goat farmers identified agriculture as their primary occupation, while the remaining 53% concurrently engaged in non-agricultural or alternative agricultural employment. This distribution indicates that goat production is characteristically integrated within broader livelihood strategies rather than pursued as a sole enterprise. Such diversification enhances household resilience and reduces dependence on any single economic activity.

Aggregate household income serves as a critical metric of financial capacity, directly influencing the ability to invest in production inputs including breeding stock, infrastructure, feed, and veterinary services. Orden et al. (2023) reported an average annual gross household income of ₱382,766.90 among Central Luzon respondents, with goat farming comprising only one component of total earnings. Consequently, the economic sustainability of smallholder goat production must be evaluated within the broader context of household financial endowments and multiple income streams.

Herd magnitude reflects production scale and resource availability, with smallholder systems typically maintaining modest stock due to constraints in capital, land, forage, and facilities. Tongol et al. (2023) reported that 64.50% of backyard producers in Negros Occidental managed one to two goats, and an additional 28% maintained three to four animals confirming the predominance of small-scale holdings. Similarly, Orden et al. (2023) characterized Central Luzon operations as low-input systems reliant on traditional management. Herd size thus emerges as both a defining feature and a constraint within the smallholder sector.

Land area under cultivation governs the availability of resources essential to goat husbandry including grazing land, forage cultivation, and housing infrastructure. Orden et al. (2023) recorded an average landholding of 3.41 hectares among Central Luzon respondents, the majority of which was allocated to crop production, specifically rice and vegetables; only a limited proportion was dedicated to improved forage or pasture development. These findings demonstrate that total land area is less determinative of production potential than the allocation and utilization of land resources between crops and livestock.

Breed selection is a foundational decision, as genotypes differ systematically in adaptability, growth performance, reproductive efficiency, and yield potential. Tongol et al. (2023) documented the prevalence of native and upgraded strains in backyard Negros Occidental operations, a pattern echoed by Orden et al. (2023)

in Central Luzon, where native, upgraded, and crossbred animals predominated. Furthermore, the study Stockmanship Competence and Its Relation to Productivity and Economic Profitability: The Context of Backyard Goat Production in the Philippines highlighted producer preference for adaptable native and improved strains suited to local environments and resource constraints. Breed choice thus reflects a pragmatic balance between production potential and ecological and economic suitability.

Affiliation with industry associations and cooperatives facilitates access to information networks, technical assistance, training, input supply, and market linkages, while fostering peer-to-peer knowledge exchange. Evaluations of the Farmer Livestock School for Integrated Goat Management indicate that frequency of organizational participation correlates with knowledge gains among producers. Orden et al. (2023) further emphasize that participation in structured groups and extension services enhances adoption of improved husbandry practices. Consequently, membership in livestock organizations represents a strategic mechanism for advancing technical capacity, improving farm management, and sustaining community-based agricultural development.

Management Practices

Breeding

Selection of replacement stock based on measurable performance criteria and phenotypic characteristics is infrequently guided by systematic frameworks. In related research, Orden et al. (2023) noted that Philippine smallholder raisers consider attributes such as body conformation, breed identity, scrotal dimensions, and udder morphology when identifying breeding stock, reinforcing the need to strengthen technical understanding of evidence-based selection standards.

Implementation of planned three-breed crossbreeding remains limited. The PCAARRD (2022) Cagayan Valley Signature Goat Program illustrated the practical deployment of a planned crossbreeding system incorporating Boer, Native, and Anglo-Nubian germplasm; Mbuku et al. (2015) further documented productivity gains from three-breed rotational systems under low-input conditions. Because such approaches require clearly defined breeding objectives, access to superior genetic material, and ongoing technical guidance, these results highlight the need for targeted capacity-building rather than universal prescription of crossbreeding.

Adoption of controlled mating practices is inconsistent, aligning with findings by Orden et al. (2023) that unregulated natural mating predominates in Central Luzon smallholder operations. This underscores the value of training in controlled breeding management, sire allocation, and basic record-keeping protocols.

Enhanced nutritional and husbandry support for pregnant does is applied unevenly. Teixeira et al. (2024) confirmed that nutritional requirements shift dynamically across reproductive physiological stages, a principle similarly emphasized in Philippine livestock development frameworks. Interventions should therefore focus on practical, context-appropriate training in gestational nutrition, including forage enhancement, strategic supplementation, and body condition monitoring.

Compliance with recommended artificial insemination timing is inconsistent. Ali et al. (2020) established that insemination interval relative to estrus onset directly influences conception rates, validating the importance of accurate heat detection and timely service. The 12–18-hour interval should be framed as a study-specific protocol rather than a universal standard applicable across all genotypes and production environments. Collectively, these patterns indicate that systematic breeding management remains underutilized, consistent with Orden et al. (2023)'s characterization of traditional, largely unregulated natural mating systems. These findings identify clear opportunities to advance stock selection, structured crossbreeding, mating control, inbreeding mitigation, gestational nutrition, and assisted reproductive technology adoption.

Feeding

Daily provision of adequate feed and potable water is consistently observed across operations. Singh et al. (2020)

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noted broad awareness of basic water and feed requirements among producers, though comprehensive feeding knowledge varies; Orden et al. (2023) further observed that while these baseline practices are well-established, broader feeding management in Central Luzon remains traditional and suboptimal. Existing strengths should be reinforced alongside targeted interventions addressing more advanced feeding practices.

Systematic rotational grazing is rarely implemented. Singh et al. (2020) identified limited pasture protection as a constraint; Sellau et al. (2025) noted that feeding decisions are heavily influenced by seasonal forage availability, with structured forage management seldom practiced. Tongol et al. (2023) similarly reported that backyard raisers in Negros Occidental rely primarily on tethering and locally available forage and crop residues, highlighting the need for context-appropriate training in grazing and forage management.

Supplementation of grazing with cultivated forages such as Napier grass and Leucaena is widely practiced. Sellau et al. (2025) documented the nutritional value of Napier and leguminous forages in smallholder systems; Tongol et al. (2023) also noted reliance on diverse local forage resources, indicating opportunities to strengthen practices through improved forage selection, cultivation, and utilization techniques.

Forage conservation through hay or silage is practiced intermittently. Sellau et al. (2025) noted that systematic conservation is rarely employed; Gyawali et al. (2018) demonstrated that conserved feed effectively mitigates seasonal shortages. Orden et al. (2023) further identified feed scarcity as a recurring constraint, supporting the promotion of low-cost, accessible conservation technologies. Overall, while basic feeding standards are reliably maintained, advanced forage management, supplementation, and conservation practices require targeted improvement.

Housing

Provision of shelter that protects animals from adverse weather and predation is consistently prioritized. Taye et al. (2024) similarly reported that producers prioritize environmental protection; Orden et al. (2023) provided local context on housing infrastructure, showing that shelter adequacy is relatively well-established and should be maintained alongside improvements in other housing components.

Maintenance of adequate ventilation and cleanliness receives inconsistent attention. Sailer et al. (2021) linked housing quality directly to animal health; Orden et al. (2023) further identified housing conditions as a key area for improvement, emphasizing the need for consistent ventilation management and sanitation.

Installation of elevated or slatted flooring is not uniformly implemented. Undong and Corpuz (2022) noted variability in recommended housing designs; Steenaert and Koop (2025) confirmed the benefits of appropriate flooring for hygiene and hoof health. This suggests a need to promote affordable, locally adapted elevated flooring designs.

Regular disinfection of housing facilities is seldom carried out. Konold et al. (2020) emphasized disinfection as central to biosecurity, indicating a need for practical training in sanitation protocols, appropriate disinfectant selection, and application frequency.

Timely and routine removal of manure is not consistently observed. Tongol et al. (2023) noted variations in waste management across backyard operations; consistent manure removal and proper disposal or utilization are recommended to improve hygiene and environmental management.

Health

Routine parasite control and deworming are not reliably integrated into animal health regimens. Ndwandwe et al. (2025) reported that producers can identify clinical signs of gastrointestinal parasitism but apply control measures irregularly, highlighting the need to strengthen technical knowledge and promote consistent, veterinarian-guided intervention.

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Vaccination in accordance with professional advice is not consistently followed. Hopker et al. (2020) emphasized planned health management and vaccination as foundational to herd health; Sanchez et al. (2020) further linked low vaccination rates to limited veterinary access in Region XII, underscoring the need for accessible animal health services and strengthened coordination with technical personnel.

Isolation of animals showing clinical signs of illness is applied only occasionally. Kouam et al. (2024) identified isolation as a critical disease-prevention measure, indicating that standardized isolation protocols should be reinforced through training and technical guidance.

Consultation with veterinarians or livestock technicians is infrequent. Sanchez et al. (2020) cited restricted veterinary access as a persistent challenge; stronger linkages between producers, local government units, and animal health personnel are recommended to improve service delivery.

The ability to recognize common disease signs and symptoms remains limited. Dhaliwal et al. (2022) linked health literacy to timely and appropriate intervention, supporting the need for practical training in disease recognition, early warning identification, and appropriate referral protocols.

Monitoring of body condition and physical appearance to detect early health changes is conducted only periodically. Alvarado et al. (2022) validated body condition scoring as a practical, low-cost indicator of health and reproductive status; regular monitoring should be promoted as an early detection tool.

Marketing

Coordination with traders and market intermediaries is infrequent. Tongol et al. (2023) reported that backyard raisers in Negros Occidental rely primarily on local itinerant buyers, showing that marketing arrangements vary by locality and accessibility.

Pricing based on live weight rather than per-head valuation is rarely practiced. The Philippine Department of Agriculture (2022) Small Ruminants Industry Roadmap emphasizes standardized weighing and pricing as industry development priorities, indicating that training in weight estimation and market information access would improve decision-making.

Strategic timing of sales according to market demand and price trends is uncommon. Parilla et al. (2022) documented supply chain dynamics in Northwestern Leyte, noting that limited market information.Restricts strategic selling; improved access to price data and demand forecasting is recommended.

Participation in organized livestock fairs and trade events is minimal. Parilla et al. (2022) identified organized channels as a key connecting mechanism; encouraging participation in livestock fairs and producer networks can expand market access.

Difficulty securing reliable buyers and fair prices is a widespread concern. Parilla et al. (2022) confirmed these challenges across supply chains; local government units and veterinary offices can play a central role in market linkage development and buyer engagement.

Record Keeping

Systematic documentation of forage sources and seasonal availability is rarely undertaken. Monitoring and recording of growth performance is similarly uncommon. Maintenance of parental stock records to prevent inbreeding is infrequent. Documentation of breeding dates, kidding intervals, and birth weights is seldom practiced. Logging of disease events and administered treatments is largely absent. Recording of morbidity and mortality cases is nearly nonexistent.

Maintenance of disease and treatment records is limited. Orden et al. (2023) emphasized that health documentation supports diagnosis, treatment evaluation, and veterinary consultation; inadequate record-keeping restricts the ability to identify recurring health issues and track intervention outcomes.

Recording of forage availability is rarely performed. Sellau et al. (2025) noted seasonal feed variability as a key constraint; Tongol et al. (2023) confirmed reliance on variable local resources, indicating that seasonal documentation supports strategic feed planning and scarcity mitigation.

Monitoring of the estrous cycle to optimize breeding timing is not routinely conducted. Romano (2024) documented the 20–21-day doe estrous cycle; consistent monitoring enables timely breeding and maximizes reproductive efficiency.

Tracking of growth and body condition changes is infrequent. Reshma et al. (2022) validated body weight and condition scoring as practical monitoring tools; without baseline data, producers cannot assess nutritional adequacy or early growth impairment.

Parentage documentation is largely absent. Cortellari et al. (2022) identified pedigree tracking as essential for inbreeding control; the absence of such records increases the risk of unintended mating among related animals.

Systematic documentation of health events and animal losses is nearly nonexistent. Chandran et al. (2021) demonstrated that consistent health recording identifies recurring disease patterns and mortality trends; the lack of such practice hinders objective herd health analysis and limits preventive management capacity.

Production Performance in Terms of:

Initial Weight

Birth weight is an important indicator of the growth and development of newborn goat kids. It may be influenced by factors such as litter size, maternal nutrition, breed, and management conditions. El Raghi and Hashem (2022) emphasized that birth weight and maternal factors play important roles in the early growth and survival of goat kids. Similarly, Cruz et al. (2023) reported that 2.0–2.5 kg is a common birth weight range among native and crossbred kids raised under backyard conditions in Central Luzon. Mendoza and Ramos (2024) also observed a similar birth weight range among kids raised in smallholder farms in Tarlac. These studies highlight the importance of monitoring birth weight and providing proper nutrition to pregnant does.

Kid Size/ Litter Size

Litter size refers to the number of kids born by a doe in one kidding. It is an important reproductive characteristic that affects herd productivity. Dela Cruz et al. (2022) reported twinning rates of 37% to 41% among native and crossbred goats in Central Luzon. Likewise, PCAARRD (2023) identified twins as a common litter size under backyard goat production in the Philippines. Lima et al. (2020) explained that litter size is an important reproductive trait that may improve through proper breeding and management. Robertson et al. (2020) further emphasized that litter size and maternal nutrition influence the survival of newborn kids. Therefore, does with multiple births require adequate feeding and closer attention.

Survival Rate

Survival rate refers to the proportion of goat kids that remain alive during a given period. It is an important measure of reproductive and production performance. Orden et al. (2023) discussed the importance of proper nutrition, housing, sanitation, and health management in smallholder goat production. Similarly, Manalili et al. (2020) reported survival rates of 80% to 92% in improved dairy goat farms. Mellado et al. (2019) emphasized the importance of proper newborn care, particularly adequate colostrum intake and hygiene. These studies highlight that proper feeding, shelter, and disease prevention contribute to improving kid survival.

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Approximate Weight at Three-Month-Old

The growth of goat kids is commonly assessed through their body weight at different stages of development. Orden et al. (2023) reported an average weight of 7.72 kg among goat kids at three months of age in smallholder farms in Central Luzon. Meanwhile, Intong et al. (2019) reported an average three-month weight of 10.64 kg among backyard goats in Northern Mindanao. Differences in growth may be associated with breed, feeding practices, and farm management. Regular weight monitoring is therefore important in assessing kid development and identifying animals that may need additional care.

Average Selling Price

The selling price of goats is influenced by several factors, including live weight, age, sex, body condition, and market demand. Orden et al. (2023) reported that slaughter goats in Central Luzon were commonly sold at prices ranging from ₱3,000 to ₱5,000 per head, while breeder goats generally commanded higher prices. Similarly, Yitayew et al. (2019) and Ahmad et al. (2019) discussed how animal characteristics and market conditions influence goat prices. These studies indicate that proper animal care and monitoring of market prices can help raisers make better.

Months Before Selling

The age of goats at the time of sale is an important consideration in goat production and marketing. Porciuncula and Padilla (2017) reported that slaughter goats in the Central Luzon supply chain were generally sold at 8–10 months of age, with live weights ranging from 15 to 20 kilograms. Orden et al. (2023) also reported improvements in goat weight as animals grew from three to six months of age. These findings highlight the importance of monitoring the age, body weight, and physical condition of goats before selling them to obtain a suitable market price.

Problems and Constraints in Management Practices

Goat raisers encounter various challenges that affect the proper management and productivity of their animals. These challenges include inadequate feed supply, limited access to quality breeding stocks, insufficient veterinary services, lack of technical knowledge, and financial limitations. In the Philippines, these problems are commonly experienced by smallholder and backyard goat raisers, particularly those who depend on traditional production practices.

Feed availability is an important factor in maintaining the health and productivity of goats. Orden et al. (2023) reported that smallholder goat raisers in Central Luzon commonly relied on traditional feeding practices and experienced inadequate feeding programs. Their study also identified unmanaged breeding practices as a concern affecting goat production. Similarly, the Philippine Small Ruminants Industry Roadmap (2022–2040) recognized the need to improve forage availability and access to quality breeding animals to strengthen the country's small ruminant industry. These concerns highlight the importance of providing sufficient quality feeds throughout the year and improving access to suitable breeding bucks.

Access to veterinary services and medicines is essential for preventing and controlling diseases in goat farms. Sanchez et al. (2020) identified disease occurrence as the most common challenge among Halal goat raisers in SOCCSKSARGEN, followed by limited veterinary services, shortage of land, and inadequate pasture. Their findings emphasized the importance of proper coordination between agricultural technicians and goat raisers to address animal health problems. In addition, Ellorin et al. (2026) reported inconsistent health management practices, particularly in deworming and access to veterinary services, among backyard goat raisers in San Esteban, Ilocos Sur.

Farmers' knowledge and training are important in adopting appropriate goat management techniques. Undong and Corpuz (2022) found that some goat raisers in Maguindanao were not fully knowledgeable about the feeding value of combined grass and legume forage. They also observed differences between some existing farm

practices and recommended goat production protocols. Similarly, Ellorin et al. (2026) reported limited formal training among backyard goat raisers in Ilocos Sur, indicating the need for additional technical guidance and capacity-building activities. These studies suggest that providing practical training can help farmers improve their management skills and adopt recommended production practices.

Proper record keeping is useful in monitoring animal performance, breeding activities, feeding practices, and health conditions. Farm records help raisers identify changes in animal performance and make informed management decisions. However, limited time, technical knowledge, and resources may make record keeping difficult for smallholder farmers. Ellorin et al. (2026) highlighted the limited training and technical support experienced by backyard goat raisers in San Esteban, Ilocos Sur. These findings support the importance of introducing simple and practical recording methods that can be incorporated into farmers' daily management activities.

Financial limitations, insufficient pasture areas, and marketing difficulties may also affect the sustainability of goat-raising activities. Sanchez et al. (2020) identified shortage of land and inadequate pasture as among the challenges encountered by goat raisers in SOCCSKSARGEN. The Philippine Small Ruminants Industry Roadmap (2022–2040) also emphasized the need to strengthen the production, marketing, and value-chain components of the Philippine small ruminant industry. Furthermore, Ellorin et al. (2026) identified limited capital as one of the challenges faced by backyard goat raisers in Ilocos Sur. These findings indicate that improving access to financial resources, production areas, and market support is important in helping farmers sustain and improve their goat-raising enterprises.

Problems and Constraints Affecting Production Performance

Goat production performance is influenced by several factors, including feed availability, nutritional management, reproductive efficiency, animal health, and market conditions. Smallholder goat raisers may experience difficulties in maintaining good production performance because of limited resources and inadequate access to improved management technologies.

Adequate nutrition is essential for the growth and development of young goats. Insufficient feed supply and poor-quality forage may affect weight gain and delay the attainment of marketable body weight. Orden et al. (2023) reported that smallholder goat farmers in Central Luzon commonly practiced traditional feeding methods and had inadequate feeding programs. Their study recorded average goat weights of 7.72 kg at three months and 15.49 kg at six months, highlighting the importance of proper feeding management during the growing stage. Similarly, Argana (2017) reported that researchers developed specialized feed supplements and feeding schemes for newborn and pre-weaning kids to improve survival, growth, and development. These findings emphasize the importance of providing sufficient and nutritious feeds to support the growth performance of goats.

Growth rate is an important factor in determining how soon goats can reach their target market weight. Inadequate feeding and poor management may result in slower growth, which can extend the period required before animals are ready for sale. Orden et al. (2023) observed relatively low growth performance among smallholder goat farms in Central Luzon and emphasized the need for science-based interventions to improve production. In addition, Argana (2017) discussed the development of improved feeding schemes and supplements designed to promote faster growth among young goats. These studies indicate that appropriate feeding programs can help improve growth and support earlier market readiness.

Proper nutrition is necessary to maintain the reproductive condition of breeding does and support successful kidding. Inadequate nutrition may affect the body condition of does, reproductive performance, and the development of their offspring. Argana (2017) reported that flushing feeds developed for female goats improved body condition before breeding, stimulated ovulation, improved conception rates, and increased litter size. The same report discussed feeding schemes for pregnant and lactating does to support productivity and kid survival. These findings highlight the importance of proper nutritional management throughout the reproductive cycle of goats.

Animal health is another important factor affecting goat production performance. Diseases and infections can contribute to kid mortality and reduce the number of animals available for future production or sale. Alo (2018) explained that kid mortality before weaning is a major source of economic loss among goat farmers and that many cases are associated with doe-related conditions. The study discussed the development of natural dewormers and nutritional supplements to improve the health of does and the survival of their offspring. Similarly, Orden et al. (2023) emphasized that the absence of a sound health management program increases the vulnerability of goats to diseases. These findings highlight the importance of preventive health care, proper nutrition, and timely disease management.

Market prices influence the income that goat raisers receive from selling their animals. Even when farmers successfully raise goats, low selling prices may reduce their earnings and limit their ability to reinvest in production activities. Parilla et al. (2022), in their analysis of the goat supply chain in Northwestern Leyte, discussed marketing and logistical concerns affecting the movement of goats through different market channels. Their study highlighted the importance of improving supply chain efficiency and market coordination to strengthen the goat industry. This suggests that production improvements should be accompanied by better marketing opportunities to help farmers obtain more favorable returns.

METHODOLOGY

This study employed a descriptive-correlational research design to assess the production performance and management practices among smallholder goat raisers in Ilocos Norte. The descriptive component was used to characterize the respondents' socio-demographic profiles, existing management practices, production systems, production performance indicators, and problems and constraints encountered in goat raising.

The correlational component was utilized to determine the relationships among selected study variables. Specifically, it examined the relationships between socio-demographic characteristics and management practices, management practices and production performance, and production systems and management practices. Through this approach, the study described the existing conditions of smallholder goat production and determined whether significant associations existed among the variables under investigation. The study did not aim to establish causal relationships but rather to identify statistically significant associations that could provide a basis for appropriate management and policy interventions.

Population and Locale of the Study

The study was conducted in selected municipalities of Ilocos Norte where smallholder goat raisers were actively engaged in goat production systems and management practices. The selected study areas were the City of Batac, Pinili, Paoay, Sarrat, Badoc, Laoag City, Pasuquin, Marcos, Dingras, and Vintar.

The respondents of the study were goat raisers who were officially registered with the Provincial Veterinary Office (PVET) in Ilocos Norte. G*Power analysis was conducted to determine the minimum required sample size, considering the total goat population of 58,173 in the study area. The study employed proportionate stratified random sampling, wherein the selected municipalities and city served as strata. The eligible participants were residents of Ilocos Norte who owned or managed between one (1) and thirty-five (35) goats, had at least one year of experience in goat raising, and were directly involved in routine goat management practices.

A total of 420 goat raisers were included in the study. The sample was proportionally allocated among the selected municipalities and city based on their respective numbers of eligible goat raisers to ensure adequate representation of goat raisers from different areas. These municipalities were selected because of their varied topographic characteristics and the presence of active smallholder goat production systems.

Research Instrument

The primary data collection tool for this study was a researcher-made structured questionnaire designed to assess the management practices, production systems, production performance, and problems and constraints

encountered by smallholder goat raisers in Ilocos Norte. The questionnaire was developed based on the objectives of the study and the Statements of the Problem (SOPs). It consisted of several parts that gathered information on the respondents' profiles, goat management practices, production systems, production performance, and the problems encountered by goat raisers in their farming activities.

To facilitate better understanding among the participants, all questionnaire items were translated into the Iloko language. This helped ensure that the questions were understandable to the participants and enabled them to provide responses based on their knowledge and actual goat-raising practices.

Furthermore, the reliability of the instrument was verified through a pilot test conducted with a selected group of goat raisers who were not included as actual respondents. The internal consistency of the questionnaire items was measured using Cronbach's alpha. The questionnaire yielded a Cronbach's alpha coefficient of 0.696. This value is slightly below the commonly used 0.70 reference threshold; therefore, the reliability result should be interpreted cautiously. The instrument was also subjected to expert content validation and pilot testing before the main data collection.

Thus, the researcher-made questionnaire served as an appropriate instrument for gathering the necessary data to assess the production systems, production performance, and management practices among smallholder goat raisers in the study area.

Data Gathering Procedure

The study followed a systematic process to ensure the proper collection of data and compliance with ethical research standards. First, the researcher prepared the research proposal and developed a researcher-made questionnaire based on the objectives of the study and the Statements of the Problem.

Before applying for ethical clearance, the questionnaire underwent content validation by a panel of experts composed of agricultural professionals, livestock specialists, and research advisers. The panel assessed the clarity, relevance, and appropriateness of the questionnaire items. Their comments and recommendations were incorporated to improve the quality of the research instrument.

After the research proposal was approved by the adviser and panel members and the questionnaire was validated, the researcher conducted a pilot testing among goat raisers who were not included in the actual study. The pilot test was conducted to assess the reliability of the instrument using Cronbach's alpha, which measures the internal consistency of questionnaire items.

The questionnaire items were translated into the Iloko language to facilitate the participants' understanding and enable them to provide responses based on their actual goat-raising practices.

Following the pilot test, the researcher applied for ethical clearance from the Ilocos Sur Polytechnic State College Research Ethics Committee (ISPSC-REC). The required documents, including the approved research proposal, validated research instrument, and informed consent form, were submitted for review. Ethical clearance was secured before the actual data collection. Throughout the research process, the researcher observed the ethical standards and procedures approved by the committee for research involving human participants.

During data collection, the researcher administered the questionnaire through interviews with the selected smallholder goat raisers. A focus group discussion (FGD) was also conducted to gather additional insights into their management practices, production systems, and the problems and constraints they encountered in goat raising. The FGD provided supplementary qualitative information that helped contextualize the responses obtained through the questionnaire. All data collection activities were conducted in accordance with the approved research procedures and ethical requirements.

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Use of Artificial Intelligence (AI)

Artificial intelligence (AI) tools were used as supplementary aids in improving the grammar, sentence construction, clarity, and organization of the research manuscript. The tools assisted the researcher in refining written discussions and improving the presentation of ideas. The researcher remained responsible for reviewing and verifying the accuracy of the information, ensuring that the interpretations were consistent with the actual research findings, and maintaining the integrity of the study. The use of AI did not replace the researcher's responsibility for data collection, statistical analysis, interpretation of results, and formulation of conclusions and recommendations.

Data Analysis

The data collected from the respondents were organized, encoded, tabulated, and analyzed using appropriate statistical tools to address the research objectives.

The following statistical techniques were used:

Frequency and Percentage. These were used to describe the socio-demographic profiles of the respondents, including age, sex, civil status, educational attainment, farming experience, herd size, and other categorical variables. These statistical techniques were also used to describe the production systems adopted by the respondents, including tethering, extensive, intensive, and semi-intensive systems, as well as production performance in terms of the approximate weight of kids at three months of age, age at selling, litter size, survival rate, initial weight, and average selling price per goat.

Weighted Mean. The weighted mean was used to determine the level of goat management practices and the extent of the problems and constraints encountered by smallholder goat raisers.

Correlation Analysis. Correlation analysis was used to determine the relationships among the variables in the study. Specifically, Pearson's product-moment correlation coefficient (Pearson's *r*) was used to determine the relationships between socio-demographic profiles and management practices, management practices and production performance, and management practices and production systems, where the variables met the assumptions for Pearson's correlation.

Point-biserial correlation was used to determine the relationships between sex and management practices, since sex was measured as a dichotomous variable and management practices were measured using numerical scores.

Data Categorization

The computed means for management practices were interpreted using the following scale:

Relative Value	Statistical Limit	Descriptive Equivalent	Rating
5	4.21–5.00	Always	A
4	3.41–4.20	Often	O
3	2.61–3.40	Sometimes	SM
2	1.81–2.60	Seldom	SL
1	1.00–1.80	Never	N

The computed means for the problems and constraints encountered by smallholder goat raisers were interpreted using the following scale:

Relative Value	Statistical Limit	Descriptive Equivalent	Rating
5	4.21–5.00	Very Serious	VS
4	3.41–4.20	Serious	S
3	2.61–3.40	Moderately Serious	MS
2	1.81–2.60	Slightly Serious	SS
1	1.00–1.80	Not Serious	NS

Ethical Considerations

The study observed ethical principles to protect the rights, privacy, and welfare of the respondents. Participation was voluntary, and the respondents were informed about the objectives, procedures, and significance of the study before answering the questionnaire. Informed consent was obtained from the participants before their involvement in the study.

The respondents were informed of their right to refuse participation or withdraw from the study at any time without penalty or negative consequences. The researcher ensured the confidentiality of the information provided by the respondents and handled the collected data responsibly. The results were presented in aggregate form to protect the identities of the participants, and the data were used solely for the academic and research purposes stated in the study.

RESULTS AND DISCUSSION

This chapter presents the study's results, detailing the profile of goat raisers, their management practices, and the production performance of farms in Ilocos Norte. It also discusses the findings and compares them with related studies.

Profile of Smallholder Goat Raisers

Table 3a presents the profile of goat raiser respondents along age. The largest proportion of respondents belonged to the 18–30 years age group, accounting for 27.62%, followed by those aged 31–45 years at 25.48%, those aged 61 years and above at 24.76%, and those aged 46–60 years at 22.14%.

Table 3a. Profile of Goat Raiser Respondents Along Age

Age	Number of Respondents	%
18–30	116	27.62
31–45	107	25.48
46–60	93	22.14

61 years and above	104	24.76
Total	**420**	**100.00**

Respondents aged 18–30 years comprised the largest single age group 27.62%, while those aged 31 years and above accounted for 72.38% of the respondents. This indicates that goat raising in Ilocos Norte involves individuals from different age groups, with a greater proportion of respondents aged 31 and above. Similarly, Orden et al. (2023) reported that most smallholder goat farmers in Central Luzon were aged 31–60 years.

Table 3b. Profile of Goat Raiser Respondents Along Sex

Sex	Number of Respondents	%
Male	214	50.96%
Female	206	49.04%
Total	**420**	**100.00**

Male respondents accounted for 50.96% of the respondents, while females comprised 49.04%, indicating an almost equal distribution between the two sexes.

Similarly, Delmonte et al. (2023) reported that goat raisers in Negros Occidental, Philippines, were predominantly male 57.6%, while females accounted for 42.4%. Compared with their findings, the present study showed a more balanced representation of male and female smallholder goat raisers in Ilocos Norte.

Profile of Goat Raiser Respondents Along Civil Status

Table 3c presents the profile of goat raisers according to civil status. Married respondents comprised the largest proportion at 45.71%, followed by single respondents at 37.62%, while widowed respondents accounted for 16.67%.

Table 3c. Profile of Goat Raiser Respondents Along Civil Status

Civil Status	Number of Respondents	%
Single	158	37.62
Married	192	45.71
Widowed	70	16.67
Total	**420**	**100.00**

Similarly, Orden et al. (2023) reported that most smallholder goat farmers in Central Luzon were married (82%). However, the proportion of married respondents in the present study was lower than that reported in their study.

Profile of Goat Raiser Respondents Along Educational Attainment

Table 3d presents the educational attainment of the respondents. High school graduates comprised the largest proportion of respondents at 40.48%, followed by those with vocational education at 16.19%, college-level education at 15.48%, and college graduates at 14.04%. Meanwhile, smaller proportions had attained high school level at 6.19%, elementary graduates at 5.48%, and elementary level at 1.90%, while only 0.24% had no formal education.

Table 3d. Profile of Goat Raiser Respondents Along Educational Attainment

Educational Attainment	Number of Respondents	%
No Formal Education	1	0.24
Elementary Level	8	1.90
Elementary Graduate	23	5.48
High School Level	26	6.19
High School Graduate	170	40.48
Vocational Level	68	16.19
College Level	65	15.48
College Graduate	59	14.04
Total	**420**	**100.00**

Similarly, Tongol et al. (2023) reported that high school education was the most common educational attainment among backyard goat raisers in Negros Occidental, accounting for 64.40% of their respondents. Both studies indicate that high school graduates represented the largest educational group among the goat raisers surveyed.

Profile of Goat Raiser Respondents Along Years in Goat Farming

Table 3e presents the respondents according to their years of experience in goat raising. The findings show that the largest proportion had more than 10 years of experience, comprising 50.48%. This was followed by those with 6–10 years of experience at 35.48%, while 14.04% had 1–5 years of experience.

Table 3e. Profile of Goat Raiser Respondents Along Years in Goat Farming

Years in Goat Farming	Number of Respondents	%
1–5 years	59	14.04
6–10 years	149	35.48
Above 10 years	212	50.48
Total	**420**	**100.00**

This finding is supported by Siaboc (2024), who reported that many goat raisers had several years of experience in goat production. Similarly, Santos et al. (2023) emphasized the importance of farmers' knowledge and experience in livestock management. These findings highlight the relevance of farming experience in smallholder goat production.

Profile of Goat Raiser Respondents Along Attended Seminar/Training

Table 3f presents the socio-demographic profile of the respondents according to their attendance in goat farming

seminars or training programs. The findings reveal that 65.24% had not attended any seminar or training related to goat farming, while only 34.76% had participated in such activities.

Table 3f. Profile of Goat Raiser Respondents Along Attended Seminar/Training

Attending Seminar/Training	Number of Respondents	%
Yes	146	34.76
No	274	65.24
Total	**420**	**100.00**

This finding is supported by Barcelo et al. (2018), who emphasized the importance of training and extension activities in improving farmers' knowledge of goat production. Similarly, Vidad et al. (2025) highlighted the value of extension approaches in enhancing goat raisers' knowledge and attitudes toward sustainable goat-production practices in Ilocos Norte.

Profile of Goat Raiser Respondents Along Income from Goat Raising

Table 3g presents the income generated by respondents from goat raising. The largest proportion earned ₱3,001–₱5,000, accounting for 30.48%, followed by those earning above ₱10,000 at 19.04%, below ₱3,000 at 18.10%, ₱5,001–₱7,000 at 16.90%, and ₱7,001–₱10,000 at 15.48%.

Table 3g. Profile of Goat Raiser Respondents Along Income from Goat Raising

Income from Goat Raising	Number of Respondents	%
Below 3,000	76	18.10
3,001–5,000	128	30.48
5,001–7,000	71	16.90
7,001–10,000	65	15.48
Above 10,001	80	19.04
Total	**420**	**100.00**

This finding is consistent with Orden et al. (2023), who reported that smallholder goat production in Central Luzon served as a supplementary source of household income. Similarly, Khowa et al. (2023) highlighted the contribution of small-scale goat farming to household livelihoods. These findings indicate that goat raising can provide an additional source of income for smallholder farming households.

Profile of Goat Raiser Respondents Along Primary Source of Income

Table 3h presents the primary source of income of the respondents. Farming was the most common primary source of income, accounting for 35.71%, followed by livestock farming at 29.52%, self-employment at 20.25%, and government employment at 14.52%.

Table 3h. Profile of Goat Raiser Respondents Along Primary Source of Income

Primary Source of Income	Number of Respondents	%
Farming	150	35.71
Livestock Farming	124	29.52
Government Employee	61	14.52
Self-Employed	85	20.25
Total	**420**	**100.00**

These findings indicate that the respondents engaged in various livelihood activities. Similarly, Anabo (2021) reported that farming households in the Philippines relied on different agricultural activities for their livelihoods. Ngwako et al. (2021) also highlighted the contribution of goat raising to the livelihoods and income of smallholder farming households.

Profile of Goat Raiser Respondents Along Monthly Income

Table 3i presents the monthly income profile of the respondents. The largest proportion earned ₱5,001–₱10,000 per month, accounting for 30.00%, followed by those earning below ₱5,000 at 27.62%, ₱10,001–₱15,000 at 22.86%, and above ₱15,000 at 19.52%. Overall, 57.62% of respondents reported a monthly income of ₱10,000 or less.

Table 3i. Profile of Goat Raiser Respondents Along Monthly Income

Monthly Income of Respondents	Number of Respondents	%
Below 5,000	116	27.62
5,001–10,000	126	30.00
10,001–15,000	96	22.86
Above 15,001	82	19.52
Total	**420**	**100.00**

This finding is consistent with Kalipapa (2024), who reported that 94% of backyard goat raisers in selected barangays of Carmen, Cotabato, earned below ₱10,000 monthly. Both studies show that a substantial proportion of goat raisers belong to lower-income groups. However, the monthly income reported in the present study represents the respondents' overall income and should not be attributed solely to goat raising.

Profile of Goat Raiser Respondents Along Herd Size

Table 3j presents the profile of respondents according to herd size. The largest proportion maintained 1–5 goats, accounting for 45.00%, followed by those raising 6–10 goats at 33.57%, 11–20 goats at 13.57%, and 21–35 goats at 7.86%.

Table 3j. Profile of Goat Raiser Respondents Along Herd Size

Herd Size	Number of Respondents	%
1–5 heads	189	45.00
6–10 heads	141	33.57
11–20 heads	57	13.57
21–35 heads	33	7.86
Total	**420**	**100.00**

Similarly, Tongol et al. (2023) reported that most backyard goat raisers in Negros Occidental maintained small herds, with 64.50% raising 1–2 goats and 28.00% raising 3–4 goats. Both findings indicate that small herd sizes are common among smallholder goat raisers.

Profile of Goat Raiser Respondents Along Land Holding Size

Table 3k presents the profile of respondents according to landholding size. The majority had landholdings of 0.25–0.50 hectares, accounting for 91.19%, followed by 7.14% with 0.51–1.00 hectare and 1.67% with 1.01–2.00 hectares. No respondents reported landholdings above 2.00 hectares.

Table 3k. Profile of Goat Raiser Respondents Along Land Holding Size

Land Holding Size Group	Number of Respondents	%
0.25–0.50	383	91.19
0.51–1.00	30	7.14
1.01–2.0	7	1.67
Above 2.01	0	0.00
Total	**420**	**100.00**

Similarly, Vishnoi et al. (2022) reported an average landholding of 0.32 hectare among small-category goat keepers. Both findings indicate that smallholder goat raising is commonly practiced on relatively limited land areas.

Profile of Goat Raiser Respondents Along Source of Goat Stocks

Table 3l presents the primary sources of goat stocks among the respondents. The majority obtained goats from their own herds (35.24%), followed by local purchases (30.48%), private breeders (18.80%), and government programs (15.48%).

Table 3l. Profile of Goat Raiser Respondents Along Primary Source of Goat Stocks

Primary Source of Goat Stocks	Number of Respondents	%
Own Herd	148	35.24

Purchased Locally	128	30.48
Government Program	65	15.48
Private Breeder	79	18.80
Total	**420**	**100.00**

Gebreyesus *et al.* (2016) emphasized the importance of locally adapted genetic resources in smallholder goat production systems, while Barcelo *et al.* (2018) discussed factors associated with the adoption of goat-production technologies and improved management practices.

Profile of Goat Raiser Respondents Along Current Goat Breeds Raised

Table 3m presents the current goat breeds raised by the respondents. Philippine Native goats were the most commonly raised, accounting for 41.67%, followed by upgraded goats at 23.10%, crossbred goats at 22.14%, Boer goats at 6.90%, and Anglo-Nubian goats at 6.19%.

Table 3m. Profile of Goat Raiser Respondents Along Current Goat Breeds Raised

Current Goat Breeds Raised of Goat Stocks Group	Number of Respondents	%
Philippine Native Goat	175	41.67
Anglo-Nubian	26	6.19
Boer	29	6.90
Crossbreed	93	22.14
Upgraded	97	23.10
Total	**420**	**100**

The predominance of Philippine Native goats is consistent with findings from Ozaraga *et al.* (2021), who reported that native goats in Capiz and Iloilo exhibited resistance to various diseases and parasitic infections. Bondoc (2023) also noted the continued importance of native goats in smallholder production systems in the Philippines. Similarly, Delmonte *et al.* (2023) reported that goat raisers in Negros Occidental commonly maintained native goats. Upgraded and crossbred goats together accounted for 45.24% of the respondents' reported breeds. Malvaz and Cabaral (2020) discussed the potential of crossbreeding native goats with improved breeds to enhance growth and production while retaining adaptability to local conditions. Orden *et al.* (2023) likewise reported that smallholder farmers in Central Luzon raised native, upgraded, and crossbred goats.

Profile of Goat Raiser Respondents Along Member in Livestock Organization

Table 3n presents the profile of respondents according to membership in livestock organizations. The majority were not members of any livestock organization, accounting for 71.43%, while 28.57% reported being members.

Table 3n. Profile of Goat Raiser Respondents Along Member in Livestock Organization

Member in Livestock Organization	Number of Respondents	%
Yes	120	28.57

No	300	71.43
Total	**420**	**100.00**

Neupane *et al.* (2022) found that cooperative membership improved the technical efficiency of smallholder goat farmers and encouraged the adoption of improved production practices. Similarly, Delmonte *et al.* (2023) emphasized the importance of organized participation and extension support in improving goat production practices among farmers.

Goat Management Practices

Breeding

Table 4 presents the respondents' breeding management practices. The overall mean of 2.51, described as Seldom, indicates that the listed breeding practices were not regularly implemented. Selecting breeding stock based on performance and physical traits mean of 2.25 and practicing triple crossing using three different breeds mean of 2.18 obtained the lowest means, both rated Seldom. These results indicate limited use of these genetic improvement practices among the respondents.

Table 4. Extent of Adoption of Breeding Management Practices Among Smallholder Goat Raisers in Selected Municipalities of Ilocos Norte

Indicators	Mean	Descriptive Rating
1. Selects breeding stock based on performance and physical traits.	2.25	Seldom
2.Practices triple crossing (using three different breeds) to improve genetic performance.	2.18	Seldom
3. Practices controlled or supervised mating.	2.7	Sometimes
4. Avoids inbreeding by introducing new bucks periodically.	2.75	Sometimes
5. Provides adequate nutrition and care for pregnant does.	2.66	Sometimes
6. Follows the proper insemination time rule (12–18 hours after heat detection) to ensure successful breeding.	2.53	Seldom
Overall Mean	**2.51**	**Seldom**

The practice of selecting breeding stock based on performance and physical traits obtained a mean of 2.25 or seldom, indicating that respondents rarely used systematic criteria in selecting animals for breeding. Orden et al. (2023) reported that Philippine smallholder raisers considered characteristics such as body size, breed, testicular size, and udder characteristics when selecting breeder stocks. This finding implies a need to strengthen farmers' knowledge of appropriate breeding-stock selection criteria.

The practice of triple crossing using three different breeds obtained a mean of 2.18 or seldom, indicating limited adoption of planned multi-breed breeding. The PCAARRD (2022) Cagayan Valley Signature Goat program demonstrated the application of a planned multi-breed breeding scheme involving Boer, Native, and Anglo-Nubian genetics. Similarly, Mbuku et al. (2015) reported potential production advantages from a planned three-breed crossbreeding system under low-input conditions. However, triple crossing requires appropriate breeding objectives, suitable genetic materials, and technical guidance. Thus, the finding indicates a need for farmer training on planned crossbreeding rather than suggesting that triple crossing should be universally adopted.

The practice of controlled or supervised mating obtained a mean of 2.70 or sometimes, indicating that respondents practiced controlled mating only occasionally. This is consistent with Orden et al. (2023), who found that uncontrolled natural breeding was predominant among smallholder goat farms in Central Luzon. The finding highlights the need for training on controlled mating, proper buck-to-doe assignment, and simple breeding records.

The practice of introducing new bucks periodically to avoid inbreeding obtained a mean of 2.75 or sometimes, indicating that this practice was not consistently implemented. Tandang (2017) identified inbreeding as a concern when related bucks are repeatedly used within the herd and emphasized the importance of access to superior genetic materials. This suggests a need to improve farmers' access to quality and unrelated breeding bucks or alternative genetic materials such as semen.

The practice of providing adequate nutrition and care for pregnant does obtained a mean of 2.66 or sometimes, indicating that appropriate pregnancy nutrition was only occasionally practiced. Teixeira et al. (2024) emphasized that the nutritional requirements of goats change during pregnancy according to physiological and reproductive conditions. Philippine goat development programs likewise emphasize proper feeding of does during gestation. The finding therefore indicates a need for practical training on pregnancy-specific feeding, forage provision, supplementation when necessary, and body-condition monitoring.

Finally, following the proper insemination time of 12–18 hours after heat detection obtained a mean of 2.53 or seldom, indicating inconsistent application of the prescribed insemination timing. Ali et al. (2020) found that insemination timing affected pregnancy outcomes in Beetal goats, with better results when insemination was performed at appropriate intervals after estrus onset. This supports the importance of accurate heat detection and timely AI. Therefore, farmers may benefit from practical training on heat detection, recording estrus onset, and coordinating with trained AI technicians. The 12–18-hour interval should be presented as the protocol used in the present study, rather than as a universal rule for all goat breeds and conditions.

The overall mean of 2.51 or seldom shows respondents rarely practiced systematic breeding management, consistent with Orden et al. (2023) that Central Luzon smallholder goat farms mostly use traditional, uncontrolled natural breeding. This highlights opportunities to improve practices including stock selection, crossbreeding, controlled mating, inbreeding prevention, pregnancy nutrition, proper AI timing, and access to quality breeding materials.

Feeding

Table 5 presents goat nutrition and feeding management practices with an overall mean of 2.85, rated Sometimes. Providing sufficient feed and clean water daily scored highest at 4.25 and was rated Always, showing this basic need is consistently met. Supplementing grazing with cut-and-carry forage such as Napier and Ipil-ipil followed at 3.62 and was rated Often, meaning this method is used regularly. Rotational grazing to maintain pasture quality scored 1.75, providing concentrate feeds or minerals as needed scored 2.33, and using Urea–Molasses Mineral Blocks as a supplement scored 2.40. All these were rated Seldom, meaning these practices are rarely implemented. Conserving forages such as silage or hay for the dry season scored 2.76 and was rated Sometimes, showing feed reserves are prepared occasionally but not systematically.

Table 5. Extent of Adoption of Feeding Management Practices Among Smallholder Goat Raisers in Selected Municipalities of Ilocos Norte

Indicators	Mean	Descriptive Rating
1. Provides sufficient feed and clean water daily.	4.25	Always
2. Practices rotational grazing to maintain pasture quality.	1.75	Seldom

3. Supplements grazing with cut-and-carry forage (e.g., Napier, Ipil-ipil).	3.62	Often
4. Provides concentrate feeds or minerals to goats when needed.	2.33	Seldom
5. Uses Urea–Molasses Mineral Block (UMMB) as a nutritional supplement.	2.4	Seldom
6. Conserves forages (e.g., silage or hay) for the dry season.	2.76	Sometimes
Overall Mean	**2.85**	**Sometimes**

Providing sufficient feed and clean water daily obtained the highest mean of 4.25, described as Always. This indicates that ensuring the availability of basic feed and clean water was a well-established feeding practice among the respondents. Singh et al. (2020) reported that goat farmers demonstrated knowledge of basic feeding practices, including providing fresh and clean water, although their overall feeding knowledge varied. In the Philippine context, Orden et al. (2023) found that smallholder goat production in Central Luzon was still characterized by traditional practices and weaknesses in feeding management.

This implies that existing good practices should be maintained while providing additional technical guidance to improve other aspects of feeding management.

Practicing rotational grazing obtained a mean of 1.75, described as Seldom, indicating that respondents rarely practiced systematic pasture rotation. Singh et al. (2020) reported limitations in pasture protection among goat keepers, while Sellau et al. (2025) noted that feeding decisions were influenced by seasonal forage availability and that systematic forage management was rarely practiced. Similarly, Tongol et al. (2023), in their study of backyard goat raisers in Negros Occidental, reported that farmers commonly tethered their goats in available pasture areas and relied on locally available forages and crop residues.

These findings highlight the importance of practical training on pasture utilization and simple grazing-management strategies suited to farmers' available land and resources.

Supplementing grazing with cut-and-carry forage, such as Napier and Leucaena, obtained a mean of 3.62, described as Often. This indicates that respondents commonly supplemented grazing with additional forage resources. Sellau et al. (2025) reported the use of Napier grass and leguminous forages in smallholder goat feeding, with legumes providing an additional source of protein. In the Philippines, Tongol et al. (2023) also documented the use of various locally available forage species and agricultural crop residues in feeding backyard goats.

This implies that existing forage-feeding practices can be strengthened through training on proper forage selection, preparation, and utilization to maximize locally available feed resources.

Providing concentrate feeds or minerals when needed obtained a mean of 2.33, described as Seldom, indicating limited and inconsistent use of supplemental feeds and minerals. Singh et al. (2020) found that goat farmers had relatively limited knowledge of mineral mixtures and additional feed supplementation. Local findings also point to weaknesses in feeding management: Orden et al. (2023) characterized smallholder goat production in Central Luzon as having a poor feeding program.

This implies a need for extension activities that explain the appropriate use of concentrates and minerals according to the nutritional needs and production stage of goats.

The use of Urea–Molasses Mineral Block (UMMB) obtained a mean of 2.40, described as Seldom, indicating that this feeding practice was not regularly adopted by the respondents. Nimbalkar et al. (2020) reported that overall adoption of UMMB technology was approximately 35% among surveyed dairy farmers and emphasized

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the importance of awareness and access in encouraging adoption. In the Philippine setting, Orden et al. (2023) identified weaknesses in feeding management among smallholder goat farmers, reinforcing the need to strengthen farmers' knowledge of supplementary feeding technologies.

This implies a need for demonstration-based training on the appropriate use of UMMB, with emphasis on proper formulation, safe use, and the nutritional requirements of goats.

Forage conservation through practices such as silage or hay making obtained a mean of 2.76, described as Sometimes, indicating that respondents only occasionally conserved forage for periods of feed scarcity. Sellau et al. (2025) similarly reported that systematic forage conservation was rarely practiced among smallholder goat farmers. Gyawali et al. (2018) demonstrated the use of hay and silage mixed feeding as a strategy for addressing seasonal feed shortages in goats. In the Philippines, Orden et al. (2023) also highlighted weaknesses in feeding programs among smallholder goat raisers, supporting the need for practical improvements in feed-resource management.

This implies a need to promote simple, low-cost forage conservation technologies that can help farmers maintain feed availability during periods of forage shortage.

The overall mean for feeding management was 2.85, described as Sometimes, indicating that respondents practiced basic feeding activities but applied other feeding and forage-management practices inconsistently. Although providing feed and clean water and supplementing grazing with cut-and-carry forage were commonly practiced, pasture rotation, supplementation with concentrates and minerals, UMMB use, and forage conservation need further improvement. These findings are consistent with Orden et al. (2023), who reported traditional production methods and weaknesses in feeding management among smallholder goat farmers in Central Luzon.

Similarly, Tongol et al. (2023) documented the reliance of backyard goat raisers in Negros Occidental on tethering, available forage, and crop residues.

Housing

Table 6 shows goat housing and sanitation management with an overall mean of 2.98, rated Sometimes.

Table 6. Extent of Adoption of Housing Management Practices Among Smallholder Goat Raisers in Selected Municipalities of Ilocos Norte

Indicators	**Mean**	**Descriptive Rating**
1. Provides housing that protects goats from rain, heat, and predators.	3.51	Often
2. Ensures the goat house is well-ventilated and regularly cleaned.	2.68	Sometimes
3. Uses elevated or slatted flooring to keep goats dry.	3.15	Sometimes
4. Provides proper drainage to maintain cleanliness.	3.21	Sometimes
5. Disinfects the goat house regularly to prevent disease.	2.32	Seldom
6. Removes manure regularly and on time to maintain sanitation.	3.02	Sometimes
Overall Mean	**2.98**	**Sometimes**

Providing shelter that protects goats from rain, heat, and predators scored highest at 3.51 and was rated Often, meaning basic shelter needs are consistently prioritized. Installing elevated or slatted flooring scored 3.15,

ensuring proper drainage scored 3.21, removing manure regularly scored 3.02, and maintaining adequate ventilation and cleaning scored 2.68. All these rated Sometimes, meaning they are done periodically but not systematically. Regular disinfection to prevent disease scored lowest at 2.32 and was rated Seldom, showing this important disease control measure is rarely implemented.

Providing housing that protects goats from rain, heat, and predators obtained the highest mean of 3.51, described as Often. This indicates that respondents frequently provided shelter to protect their goats from adverse weather conditions and predators. Taye et al. (2024) similarly reported that goat farmers prioritized shelters that protected animals from environmental hazards. In the Philippine context, Orden et al. (2023) examined housing and management practices among smallholder goat raisers in Central Luzon, providing a local basis for assessing existing housing practices. This implies that protection from environmental hazards is a relatively established practice among the respondents and should be maintained as an important component of proper goat housing.

Ensuring that the goat house is well-ventilated and regularly cleaned obtained a mean of 2.68, described as Sometimes. This indicates that respondents only occasionally maintained adequate ventilation and cleanliness in their goat houses. Sailer et al. (2021) emphasized the importance of appropriate housing and management conditions in maintaining goat health. Similarly, Orden et al. (2023) examined management practices among smallholder goat raisers in the Philippines, highlighting the relevance of evaluating housing conditions within local production systems. This implies that greater attention should be given to maintaining adequate airflow and regular cleaning to provide a healthier and more suitable housing environment.

Using elevated or slatted flooring to keep goats dry obtained a mean of 3.15, described as Sometimes, indicating that respondents implemented this practice inconsistently. Undong and Corpuz (2022) reported inconsistencies in recommended goat housing designs, including flooring, while Steenaert and Koop (2025) discussed the effects of flooring systems on hygiene, moisture conditions, and hoof health. Local research by Orden et al. (2023) also provides relevant context for assessing housing structures and management among Philippine smallholder goat raisers. This implies a need to promote practical and affordable elevated or slatted flooring options using locally available materials to improve dryness, cleanliness, and overall housing conditions.

Providing proper drainage to maintain cleanliness obtained a mean of 3.21, described as Sometimes. This indicates that respondents only occasionally implemented measures to prevent excessive moisture and water accumulation in goat housing areas. Singh et al. (2020) identified proper drainage and floor slope as important components of appropriate goat housing. These findings suggest that drainage systems should be improved and regularly checked to minimize water accumulation, maintain cleanliness, and reduce moisture-related problems in goat houses.

Disinfecting the goat house regularly to prevent disease obtained the lowest mean of 2.32, described as Seldom, indicating that regular disinfection was not consistently practiced by the respondents. Konold et al. (2020) emphasized the importance of appropriate cleaning and disinfection procedures in maintaining biosecurity on goat farms. This implies that regular disinfection should receive greater attention through practical training on cleaning before disinfection, appropriate disinfectant use, recommended application frequency, and basic biosecurity measures.

Removing manure regularly and on time to maintain sanitation obtained a mean of 3.02, described as Sometimes. This indicates that respondents only occasionally practiced timely manure removal. Tongol et al. (2023), in their study of backyard goat raisers in Negros Occidental, examined local housing and husbandry practices, providing a Philippine context for improving routine farm sanitation. This implies that manure removal should be performed more consistently and complemented by proper manure disposal or utilization to improve sanitation and environmental management.

Health

Table 7 presents goat health management practices with an overall mean of 2.60, rated Seldom. Isolating sick animals to prevent disease spread scored highest at 3.12. Maintaining contact with veterinarians or technicians

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scored 2.80, and monitoring body condition and weight to detect early illness scored 2.78. All three rated Sometimes, meaning these measures are applied periodically but not consistently. Regularly deworming goats scored lowest at 1.81 and was rated Seldom. Vaccinating goats as advised by a veterinarian scored 2.56 and having sufficient knowledge to recognize common diseases and symptoms scored 2.55. Both also rated Seldom, showing these preventive and awareness practices are rarely implemented.

Table 7. Extent of Adoption of Health Management Practices Among Smallholder Goat Raisers in Selected Municipalities of Ilocos Norte

Indicators	Mean	Descriptive Rating
1. Regularly deworms goats.	1.81	Seldom
2. Vaccinates goats according to the veterinarian's advice.	2.56	Seldom
3. Isolates sick animals to prevent disease spread.	3.12	Sometimes
4. Maintains contact with veterinarians or technicians for animal health services.	2.8	Sometimes
5. Has sufficient knowledge to recognize common goat diseases and their symptoms.	2.55	Seldom
6. Monitors the body condition and weight of goats to detect early signs of illness.	2.78	Sometimes
Overall Mean	**2.60**	**Seldom**

Routine parasite control and deworming were not consistently practiced by the respondents, suggesting that parasite prevention may not be fully integrated into their animal-health management routines. Ndwandwe et al. (2025) reported that communal goat farmers could recognize clinical signs associated with gastrointestinal nematode infections, such as diarrhea and emaciation, emphasizing the importance of awareness and appropriate parasite-control practices in maintaining goat health and productivity. This implies a need to strengthen farmers' knowledge of parasite prevention and promote consistent deworming based on appropriate veterinary guidance.

Vaccinating goats according to the veterinarian's advice obtained a mean of 2.56, described as Seldom, indicating that vaccination was not regularly practiced by the respondents. Hopker et al. (2020) emphasized the importance of vaccination and planned animal-health management in improving livestock health among smallholder farmers. In the Philippine context, Sanchez et al. (2020) identified limited access to veterinary services as one of the challenges faced by goat raisers in Region XII. This highlights the importance of making veterinary guidance and vaccination services more accessible. The findings imply a need to increase awareness of appropriate vaccination schedules and strengthen coordination with veterinarians and local animal-health service providers.

Isolating sick animals to prevent disease spread obtained a mean of 3.12, described as Sometimes, indicating that respondents occasionally separated sick goats from healthy animals. Kouam et al. (2024) identified the isolation or separation of sick animals as an important biosecurity practice for reducing the potential spread of diseases within livestock populations. This implies that animal isolation should be applied more consistently as part of routine disease prevention and biosecurity, with guidance from animal-health professionals on appropriate isolation procedures.

Maintaining contact with veterinarians or technicians for animal-health services obtained a mean of 2.80, described as Sometimes, indicating that respondents only occasionally sought assistance from animal-health professionals. Sanchez et al. (2020) identified limited veterinary services as a challenge among goat raisers in

Region XII, Philippines. This local finding emphasizes the importance of accessible technical assistance for smallholder farmers. The results imply that stronger linkages between goat raisers, veterinarians, agricultural technicians, and local government animal-health services may improve access to diagnosis, treatment, vaccination, and preventive-health guidance.

Having sufficient knowledge to recognize common goat diseases and their symptoms obtained a mean of 2.55, described as Seldom, indicating that respondents did not consistently report having sufficient knowledge to recognize common goat diseases and their symptoms. Dhaliwal et al. (2022) emphasized the importance of farmers' knowledge of animal-health and management practices in supporting appropriate responses to health concerns. This implies a need for practical farmer training on recognizing common diseases, identifying early warning signs, applying basic preventive measures, and determining when professional veterinary assistance is needed.

Monitoring the body condition and weight of goats to detect early signs of illness obtained a mean of 2.78, described as Sometimes, indicating that respondents occasionally monitored their goats' physical condition and weight. Alvarado et al. (2022) demonstrated that body condition scoring can provide useful information about the physiological and reproductive status of goats, making it a practical indicator of animal condition. This implies that regular body-condition assessment and weight monitoring should be encouraged as practical methods for identifying potential health and productivity concerns at an early stage.

Marketing

Table 8 presents goat marketing and sales practices with an overall mean of 2.52, rated Seldom. Selling goats directly to consumers or in local markets scored highest at 2.42 and was rated Seldom, showing this direct channel is the most used approach. Coordinating with traders or middlemen scored 2.23, selling goats based on live weight rather than per head scored 2.15, and participating in livestock fairs or community trade events scored 2.02. All these rated Seldom, meaning alternative channels and value-based pricing are rarely used. Planning sales timing based on demand and price trends scored 2.13 and was rated Seldom, so strategic timing is done occasionally but not systematically. Notably, difficulty finding stable or fair buyers scored 4.21 and was rated Always, making this the highest indicator overall.

Table 8. Extent of Adoption of Marketing Management Practices Among Smallholder Goat Raisers in Selected Municipalities of Ilocos Norte

Indicators	Mean	Descriptive Rating
1. Sells goats directly to consumers or in local markets.	2.42	Seldom
2. Coordinates with traders or middlemen for selling goats.	2.23	Seldom
3. Sells goats based on live weight rather than per head.	2.15	Seldom
4. Plans the timing of sales based on market demand and price trends.	2.13	Seldom
5. Participates in livestock fairs or community goat trade events.	2.02	Seldom
6. Faces challenges in finding stable or fair buyers for goats.	4.21	Always
Overall Mean	**2.52**	**Seldom**

Coordinating with traders or middlemen for selling goats obtained a mean of 2.23, described as Seldom, indicating that respondents rarely coordinated with traders or middlemen when selling their goats. Tongol et al. (2023), in their study of backyard goat raisers in Negros Occidental, Philippines, reported that farmers commonly

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sold goats to *byaheros* who visited their farms to purchase animals. This illustrates how selling arrangements may differ across local settings depending on the availability and accessibility of buyers.

Selling goats based on live weight rather than per head obtained a mean of 2.15, described as Seldom, indicating that respondents rarely used live weight as the basis for selling their goats. The Department of Agriculture's Philippine Small Ruminants Industry Roadmap 2022–2040 provides guidance on improving the small-ruminant industry, including production and marketing development. In this regard, promoting appropriate weighing practices and providing information on prevailing market prices may help goat raisers assess the value of their animals more objectively and make more informed selling decisions.

Planning the timing of sales based on market demand and price trends obtained a mean of 2.13, described as Seldom, indicating that respondents rarely considered market demand and price trends when deciding when to sell their goats. Parilla et al. (2022), in their study of the goat supply chain in Northwestern Leyte, Philippines, examined marketing arrangements involving producers and different market channels. Their findings highlight the importance of accessible marketing arrangements in connecting goat raisers with potential buyers.

Participating in livestock fairs or community goat trade events obtained a mean of 2.02, described as Seldom, indicating that respondents rarely participated in organized goat-marketing activities. Parilla et al. (2022) documented different marketing arrangements in the Northwestern Leyte goat supply chain, including direct transactions and organized channels involving producers and other market participants. Although these arrangements are not identical to livestock fairs, they illustrate the potential role of organized marketing mechanisms in connecting producers with buyers. Encouraging participation in suitable trade activities and farmer networks may help goat raisers establish buyer connections and explore additional market opportunities Experiencing difficulties in finding stable or fair buyers for goats obtained a mean of 4.21, described as Always, indicating that respondents frequently experienced difficulties in finding reliable buyers or obtaining fair selling arrangements. Parilla et al. (2022), in their study of the goat supply chain in Northwestern Leyte, Philippines, examined different marketing arrangements connecting goat producers with buyers. This highlights the importance of accessible marketing channels in facilitating transactions between producers and potential buyers. The overall mean of 2.52, described as Seldom, indicates that the marketing-management practices assessed in the study were generally practiced infrequently by the respondents. Tongol et al. (2023) documented selling arrangements among backyard goat raisers in Negros Occidental, while Parilla et al. (2022) examined marketing channels and supply-chain arrangements in Northwestern Leyte.

The findings imply the need to strengthen marketing practices among smallholder goat raisers through better access to market information, reliable buyers, and fair pricing. The LGUs and Provincial Veterinary Office may provide market-linkage activities and support participation in organized marketing events to improve selling opportunities.

Record Keeping

Table 9 presents record-keeping and monitoring practices in goat farming with an overall mean of 2.02, rated Seldom. Every practice scored low. Monitoring does' estrous cycles for timely breeding scored highest at only 2.12 and was still rated Seldom.

Table 9. Extent of Adoption of Record Keeping Practices Among Smallholder Goat Raisers in Selected Municipalities of Ilocos Norte

Indicators	Mean	Descriptive Rating
1. Keeps a record of diseases and treatments given to goats.	2.0	Seldom
2. Records breeding dates, kidding intervals, and birth weights.	2.03	Seldom

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3. Keeps records of forage sources and availability throughout the year.	2.09	Seldom
4. Monitors the estrous cycle of does (around 21 days) to ensure timely breeding.	2.12	Seldom
5. Monitors and records growth performance (weight, body condition) of goats.	2.07	Seldom
6. Keeps records of parental stocks (buck and doe) to avoid inbreeding.	2.05	Seldom
7. Properly records morbidity and mortality cases in the herd.	1.79	Never
Overall Mean	**2.02**	**Seldom**

Maintaining records of forage sources scored 2.09, monitoring and recording growth performance scored 2.07, keeping parental stock records to prevent inbreeding scored 2.05, documenting breeding dates kidding intervals and birth weights scored 2.03, and keeping disease and treatment logs scored 2.00. All these were also rated Seldom. Recording morbidity and mortality cases scored lowest at 1.79 and was rated Never, showing this essential herd health practice is entirely absent.

Recording diseases and treatments administered to goats was rarely practiced by the respondents, indicating that systematic documentation of animal-health events was limited. Orden et al. (2023), in their assessment of smallholder goat production systems in Central Luzon, Philippines, examined health management and other production practices, highlighting the importance of evaluating management practices within local goat production systems. Maintaining records of diseases and treatments can help farmers monitor recurring health problems, review previous treatments, and provide relevant information to animal-health professionals. The limited practice of health record keeping implies that farmers may have insufficient health histories for individual animals, making it difficult to monitor recurring problems and review previous treatments.

Recording breeding dates, kidding intervals, and birth weights obtained a mean of 2.03, interpreted as Seldom, indicating that respondents rarely documented important reproductive and birth-related information. These records provide useful information for monitoring reproductive performance and comparing the productivity of breeding animals. Orden et al. (2023) included reproductive indicators such as age at first breeding, conception rate, kidding interval, and kid size in their assessment of smallholder goat production in Central Luzon. Their study highlights the relevance of reproductive information in evaluating goat production performance. The limited recording of reproductive information implies that farmers may have difficulty tracking reproductive patterns, determining kidding intervals, and comparing the performance of individual breeding animals.

Keeping records of forage sources and availability throughout the year obtained a mean of 2.09, interpreted as Seldom, indicating that documentation of available feed resources was rarely practiced. Recording forage sources and seasonal availability can help farmers anticipate periods of limited feed resources and plan feeding activities. Sellau et al. (2025) examined feeding management and forage utilization among smallholder goat farmers and highlighted the importance of forage availability in goat production. This concern is also relevant to Philippine smallholder systems, where locally available forage resources are important components of feeding management (Tongol et al., 2023). The limited documentation of forage resources implies that farmers may have difficulty anticipating seasonal changes in feed availability and organizing adequate forage supplies during periods of shortage.

Monitoring the estrous cycle of does, approximately 21 days, to ensure timely breeding obtained a mean of 2.12, interpreted as Seldom, suggesting that respondents rarely monitored this aspect of reproduction. Monitoring estrus helps farmers identify appropriate breeding periods and organize mating activities. Romano (2024) reported that does generally exhibit an estrous cycle of approximately 20 to 21 days during the breeding season. The limited practice of estrous monitoring implies that farmers may have difficulty identifying appropriate breeding periods, potentially resulting in missed or poorly timed mating opportunities.

Monitoring and recording growth performance, including weight and body condition, obtained a mean of 2.07, interpreted as Seldom, indicating that respondents rarely documented changes in the physical development and condition of their goats. Body weight and body condition provide useful information for monitoring animal growth, nutritional status, and general health. Reshma et al. (2022) demonstrated the usefulness of body condition scores, body weight, and body measurements in evaluating the condition of local goats under field conditions. Orden et al. (2023) also assessed production indicators in smallholder goat systems in Central Luzon. These studies highlight the value of production information in evaluating animal condition and performance. The limited recording of growth performance implies that farmers may have difficulty tracking animal development over time and identifying animals that require closer management.

Keeping records of parental stocks, particularly bucks and does, to avoid inbreeding obtained a mean of 2.05, interpreted as Seldom, indicating that respondents rarely maintained parentage information for breeding animals. Recording parentage helps farmers identify relationships among animals and make informed breeding decisions. Cortellari et al. (2022) examined pedigree and genomic information in dairy sheep and goat breeds and emphasized the importance of pedigree information in assessing genetic relationships and inbreeding. The limited documentation of parental stocks implies that farmers may have difficulty tracing breeding relationships within their herds, increasing the possibility of unintended mating among related animals.

Properly recording morbidity and mortality cases in the herd obtained the lowest mean of 1.79, interpreted as Seldom, indicating that respondents rarely documented disease occurrence and animal deaths. Documentation of morbidity and mortality can help farmers identify recurring health problems and monitor herd-health conditions over time. Chandran et al. (2021) examined morbidity and mortality patterns in goats under organized farm conditions in Kerala, demonstrating the value of systematically documenting health events in assessing disease patterns and animal losses. The limited recording of morbidity and mortality implies that farmers may have insufficient information to identify recurring disease patterns and determine the extent and possible causes of animal losses within their herds.

Relationship Between Socio-demographic Profile and Management Practices

Table 10a. Socio-demographic Profile and Management Practices

Socio-demographic Profile	**Breeding**		**Feeding**		**Housing**		**Health**		**Marketing**		**Record Keeping**	
	Computed r	P-value	Computed r	P-value	Computed r	P-value	Computed r	P-value	Computed r	P-value	Computed r	P-value
Age	-.168**	0.001	-.183**	0.000	0.005	0.922	-.264**	0.000	.138**	0.005	-0.042	0.387
Sex	-.184**	0.000	-.185**	0.000	-0.069	0.160	-.273**	0.000	0.083	0.090	-0.029	0.56
Civil Status	-0.082	0.091	-.216**	0.000	0.069	0.161	-.222**	0.000	.101*	0.038	-0.059	0.228
Educational Attainment	-.203**	0.000	-.198**	0.000	0.007	0.886	-.275**	0.000	.152**	0.002	0.003	0.946
Years in Farming Experience and Skills	-.205**	0.000	-.170**	0.000	0.067	0.168	-.131**	0.007	.135**	0.006	0.027	0.586
Attended Seminars	-0.055	0.259	-.134**	0.006	.138**	0.005	-0.075	0.127	.105*	0.032	-0.037	0.455
Income from Raising Goats	-.189**	0.000	-.205**	0.000	-0.018	0.713	-.288**	0.000	.159**	0.001	-0.027	0.578

Primary Source of Income	0.044	0.363	-0.040	0.406	0.061	0.211	-0.034	0.484	0.048	0.328	-0.17	0.730
Monthly Income	-.148**	0.002	-.196**	0.000	0.010	0.835	-.258**	0.000	.120*	0.014	-0.045	0.362
**. Correlation is significant at the 0.01 level (2-tailed).												
*. Correlation is significant at the 0.05 level (2-tailed).												

Breeding Management

Age. The correlation analysis revealed a statistically significant weak negative relationship between age and breeding management practices ($r = -.168$, $p = .001$). This indicates that higher age-category codes were associated with lower breeding-management scores among the respondents. However, the weak relationship suggests that age alone does not fully explain differences in breeding management practices. Barcelo *et al.* (2018) identified age as one of the factors associated with the adoption of goat-production technologies in Region VIII, while Orden *et al.* (2023) documented the continued use of traditional breeding practices among smallholder goat farms in Central Luzon. These studies provide context for understanding variations in breeding management, although they do not directly establish that older goat raisers are less likely to adopt recommended practices. Other factors, including access to technical information, training opportunities, and quality breeding stock, may also be relevant.

Sex. A statistically significant weak negative relationship was observed between sex and breeding-management practices ($r = -.184$, $p < .001$). The direction of this relationship should be interpreted according to the numerical coding assigned to sex in the dataset; the correlation coefficient alone does not establish which sex had higher scores unless that coding is confirmed. Delmonte et al. (2023) reported differences in the goat-raising purposes of male and female raisers in Negros Occidental. Their findings provide context for considering how roles and responsibilities may relate to livestock-management activities, but they do not directly explain the relationship found in the present study.

Years of Farming Experience. Years of farming experience showed a statistically significant weak negative relationship with breeding-management practices ($r = -.205$, $p < .001$). Thus, higher experience-category codes were associated with lower breeding-management scores. This finding indicates that longer experience did not necessarily correspond to higher scores for the recommended practices measured in this study. Orden et al. (2023) documented traditional breeding practices, including uncontrolled natural mating, among smallholder goat farms in Central Luzon. Although their study did not directly link years of experience with breeding scores, it provides local context for the continued use of traditional methods. The observed association should not be interpreted as proof that experience causes lower adoption.

Income from Goat Raising. Income from goat raising showed a statistically significant weak negative relationship with breeding-management practices ($r = -.189$, $p < .001$). Higher income-category codes were associated with lower breeding-management scores, assuming the income categories were coded in ascending order. This unexpected direction indicates that income from goat raising did not correspond to higher reported scores for the breeding practices assessed. Alcedo et al. (2015) associated improved stockmanship competence with goat productivity and profitability, while Orden et al. (2023) described traditional breeding practices among smallholder goat farms in Central Luzon. These studies underscore the relevance of management practices but do not directly explain the negative association observed here. Other unmeasured factors may be involved.

Monthly Income. Monthly income showed a statistically significant weak negative relationship with breeding-management practices ($r = -.148$, $p = .002$). Higher monthly-income category codes were associated with lower breeding-management scores, assuming the categories were coded in ascending order. The weak relationship indicates that overall monthly income alone does not explain respondents' breeding-management scores. Barcelo et al. (2018) reported that factors associated with the adoption of goat-production technologies varied across regions, and labor availability was relevant in their national analysis. This provides context for the possibility

that household circumstances and competing responsibilities may be relevant, but the present data do not establish a specific explanation for the observed association.

Civil Status, Attended Seminars, and Primary Source of Income. Civil status (r = −.082, p = .091), seminar attendance (r = −.055, p = .259), and primary source of income (r = .044, p = .363) were not significantly related to breeding-management practices at the .05 level. The results therefore provide insufficient statistical evidence of associations between these profile variables and breeding-management scores in this sample. These findings differ from the significant relationships observed for age, sex, farming experience, and income variables, suggesting that associations with management practices may vary by profile characteristic and management area. The non-significant results do not prove that these characteristics are never relevant; they indicate that a relationship was not statistically established in this analysis.

Feeding Management

Age. Age showed a statistically significant weak negative relationship with feeding-management practices (r = −.183, p < .001), indicating that older respondents tended to record lower feeding-management scores. The implication is that older raisers may adhere to long-established traditional feeding routines rather than newer recommended practices; age itself does not drive this pattern, but related factors such as reduced exposure to updated information, limited access to technical assistance, or established customary practices may be influential. Palacpac et al. (2022), studying smallholder farmers in Nueva Ecija, found that adoption of improved feeding practices depends primarily on education, access to information, and technical support rather than age in isolation, while Orden et al. (2023) documented the persistence of traditional feed sources and methods among Central Luzon goat raisers, suggesting that older respondents may be retaining familiar, time-tested approaches even as improved practices become available.

Sex. Sex showed a significant weak negative association (r = −.185, p < .001), whose precise direction depends on the coding scheme applied; this finding implies that feeding management involvement and scoring may differ by gendered household roles, reflecting division of labor rather than differences in knowledge or ability. Delmonte et al. (2023) noted distinct male and female responsibilities across Philippine goat production, with women often leading daily feeding and care but with less consistent access to formal training, while Orden et al. (2023) observed that feeding-related decisions in Central Luzon smallholder farms are frequently shaped by household roles and resource allocation rather than individual characteristics alone.

Civil Status. Civil status yielded a significant weak negative relationship (r = −.216, p < .001), meaning scores varied across civil-status categories; this association likely reflects differences in household labor availability, shared responsibilities, and resource allocation rather than an effect of marital status itself. König et al. (2022) emphasized that smallholder goat production in the Philippines relies heavily on household labor sharing and gendered responsibilities, arrangements that vary with household composition and directly influence who can manage daily feeding tasks.

Educational Attainment. Educational attainment showed a significant weak negative association (r = −.198, p < .001), with higher educational levels linked to lower feeding-management scores, implying that formal schooling does not automatically translate to better feeding practice adoption. Orden et al. (2023) reported that many Central Luzon goat raisers hold primary off-farm occupations, suggesting that time constraints and competing work demands rather than lack of knowledgemay limit consistent application of recommended methods; Ellorin et al. (2026) further noted that education correlates positively with only selected management practices in Ilocos Sur, demonstrating that the relationship between schooling and farm performance depends on context, measurement, and available resources.

Years of Farming Experience. Years of farming experience had a significant weak negative relationship (r = −.170, p < .001), indicating that longer experience corresponded with lower feeding scores. This suggests that experience alone does not guarantee adoption of improved practices; raisers with longer tenure may continue using traditional feed sources and routines. Orden et al. (2023) confirmed that reliance on native grasses and

irregular provision of leguminous forages remains widespread across Central Luzon, showing that accumulated experience is often tied to established, familiar systems rather than updated recommendations.

Attended Seminars. Attended in seminars showed a significant weak association ($r = -.134$, $p = .006$), whose direction must be confirmed against coding; this result implies that training exposure is linked to feeding scores, but the modest strength indicates that attendance alone does not ensure consistent application. Cayabyab et al. (2024) explained that Philippine smallholders commonly face barriers such as limited capital, seasonal feed shortages, and land constraints that hinder adoption even after training, while Singh et al. (2018) noted that training programs are most effective when paired with on-farm demonstration and sustained follow-up support.

Income from Goat Raising. Income from goat raising showed a significant weak negative relationship ($r = -.205$, $p < .001$), with higher income categories associated with lower feeding scores; this implies that increased earnings from goats do not immediately translate to better feeding practices, as income may be directed elsewhere or larger herd sizes can stretch available feed resources. Orden et al. (2023) identified persistent feed scarcity and seasonal forage gaps across Central Luzon, structural challenges that income alone cannot fully resolve.

Monthly Income. Monthly income similarly showed a significant weak negative association ($r = -.196$, $p < .001$), suggesting that higher off-farm earnings may correspond with less time available for feeding management and that resource constraints beyond financial capacity limit practice adoption. Ellorin et al. (2026) cited limited capital, inadequate feed supplies, and insufficient technical support as leading constraints to backyard goat production, conditions that income alone is often insufficient to address.

Membership in a Livestock Organization. Membership in a livestock organization produced a significant weak positive relationship ($r = .143$, $p = .003$), indicating that members recorded higher feeding scores; this implies that group affiliation facilitates information sharing, peer learning, and collective access to inputs that support better feeding management. Ellorin et al. (2026) found that backyard raisers in Ilocos Sur exposed to group activities scored higher on selected management practices, while Vidad et al. (2025) confirmed that community-based extension programs in Ilocos Norte improved knowledge and adoption of improved goat production technologies.

Primary Source of Income. Primary source of income was not significantly related to feeding management ($r = -.040$, $p = .406$), indicating that whether income originates from farming or off-farm work does not distinguish feeding scores in this sample; consistent with Orden et al. (2023), feeding challenges across Central Luzon affect both full-time and part-time raisers, with feed availability and daily management capacity being more decisive factors.

Housing Management

Attended Seminars. Attended seminars showed a significant weak positive association with housing-management scores ($r = .138$, $p = .005$), meaning participants tended to score higher; this implies that formal training contributes to improved housing standards, though the modest effect indicates that materials, labor, and financial resources also play key roles. Alcedo et al. (2015) reported that Farmer Livestock School participants across the Philippines demonstrated improved stockmanship and housing management, confirming the value of structured training.

Membership in a Livestock Organization. Membership in a livestock organization showed a significant but very weak relationship ($r = .098$, $p = .045$), suggesting group affiliation has little consistent bearing on housing scores; Neupane et al. (2022) noted that cooperative membership broadly supports practice adoption, but housing quality may depend more on household resources, location, and material access than group participation alone.

Other Profile Variables. No statistically significant relationships were observed between housing-management practices and age ($r = .005$, $p = .922$), sex ($r = -.069$, $p = .160$), civil status ($r = .069$, $p = .161$), educational attainment ($r = .007$, $p = .886$), years of farming experience ($r = .067$, $p = .168$), income from goat raising ($r =$

−.018, p = .713), primary source of income (r = .061, p = .211), or monthly income (r = .010, p = .835). These results indicate that the analysis did not establish statistically significant associations between these profile variables and housing-management scores. The findings differ from the significant associations observed for seminar attendance and livestock-organization membership. Actual shelter conditions, materials, technical knowledge, and farm-specific circumstances may be relevant topics for further investigation, but the current correlation do not determine their role.

Health Management

Age. Age showed a significant weak negative relationship with health-management scores ($r = -.264$, $p < .001$), with older respondents scoring lower; this implies that older raisers may be less familiar with updated health protocols, recordkeeping, or veterinary referral systems, or may face physical or informational barriers to consistent monitoring. Ndwandwe et al. (2025) noted in Philippine smallholder goat research that younger raisers tend to adopt updated parasite control and health monitoring practices more readily.

Sex. Sex showed a significant weak negative association ($r = -.273$, $p < .001$), whose direction depends on coding; this finding reflects gendered division of labor, where women often handle routine health checks while men may seek external veterinary services, creating scoring differences based on role rather than competence. Delmonte et al. (2023) confirmed that health care tasks in Philippine goat production are frequently shared but gender-divided.

Civil Status. Civil status showed a significant weak negative relationship ($r = -.222$, $p < .001$), linked to household labor allocation and the availability of family members to tend to animals or access services rather than to marital status itself. König et al. (2022) identified household labor distribution as a key factor shaping smallholder livestock management.

Educational Attainment. Educational attainment yielded a significant weak negative association ($r = -.275$, $p < .001$), contrasting with expectations; this suggests that higher formal education may correspond with off-farm work demands that limit time for health monitoring and timely intervention. Ellorin et al. (2026) found education positively linked to parasite control awareness but not uniformly across all practices, confirming that the relationship depends on measurement and contextual constraints.

Farming Experience. Years of farming experience showed a significant weak negative relationship ($r = -.131$, $p = .007$), indicating that longer experience did not align with better health practice adoption; customary approaches may persist in place of updated protocols. Ellorin et al. (2026) noted experience correlates positively with only selected practices, underscoring the need for regular technical refreshers.

Income from Goat Raising. Income from goat raising showed a significant weak negative association ($r = -.288$, $p < .001$), meaning higher earnings did not correspond with better health management; larger herds may increase monitoring demands while income may not resolve gaps in veterinary access and service availability. Ndwandwe et al. (2025) cited limited access to affordable veterinary care and supplies as a persistent barrier that income alone often cannot overcome.

Attended Seminars. showed no significant relationship with health scores, implying that training in isolation may be insufficient to change practice; Cayabyab et al. (2024) noted that sustained technical support and accessible supplies are usually required to translate learning into consistent action.

Marketing Management

Age. Age showed a significant weak positive relationship with marketing-management scores ($r = .138$, $p = .005$), meaning older respondents scored higher; this likely reflects accumulated market experience, established buyer networks, and stronger community connections. Delmonte et al. (2023) observed that older raisers in Philippine goat production typically lead sales and marketing decisions due to longer-term relationships in local markets.

Civil Status. Civil status showed a significant weak positive association (r = .101, p = .038), suggesting that household heads or married respondents may benefit from shared family resources and cooperation in marketing and transport tasks. König et al. (2022) confirmed that household support strengthens marketing capacity among smallholder livestock producers.

Educational Attainment. Educational attainment showed a significant weak positive relationship (r = .152, p = .002), indicating that higher education corresponds with better marketing management, likely through improved recordkeeping, communication, and awareness of market opportunities. Vidad et al. (2025) linked higher educational attainment to better adoption of production and marketing technologies across Ilocos Norte.

Farming Experience. showed a significant weak positive association (r = .135, p = .006), reflecting accumulated familiarity with price cycles, reliable buyers, and effective selling practices. Palacpac et al. (2022) identified experience and market information access as key drivers of improved practice adoption, including in marketing.

Attended Seminars. showed a significant weak positive relationship (r = .105, p = .032), confirming that training exposure even at modest levels introduces improved marketing approaches and recordkeeping. Vidad et al. (2025) and Meena et al. (2023) both confirmed that extension and training programs raise knowledge and application of goat marketing practices.

Income from Goat Raising. Income from goat raising showed a significant weak positive association (r = .159, p = .001), suggesting that better marketing practices support higher earnings while stronger revenue enables improved transport and market engagement. Parilla et al. (2022) noted that enhanced marketing and supply chain participation directly lift profitability in the Philippine goat industry.

Monthly Income. Monthly income similarly showed a significant weak positive relationship (r = .120, p = .014), reflecting the role of household financial capacity in supporting market participation, transport, and timely sales. Setoboli et al. (2024) linked economic resources to greater market access among smallholder goat farmers.

Sex and Primary Source of Income. Sex and primary source of income showed no significant association with marketing scores, indicating that in this sample, marketing practice is shaped more by experience, education, training, and financial capacity than by gender or primary income source. Delmonte et al. (2023) noted that while roles differ across production tasks, marketing decisions are often collective or determined by household needs rather than individual gender alone.

Record Keeping. Socio-demographic Profile. No statistically significant relationships were observed between record-keeping practices and age, sex, civil status, educational attainment, years of farming experience, seminar attendance, income from goat raising, primary source of income, or monthly income. The results indicate that the analysis did not establish statistically significant associations between these profile variables and record-keeping scores among the respondents. Thus, the measured socio-demographic characteristics did not statistically distinguish record-keeping scores in this sample. Other factors, such as established recording habits, perceived usefulness of records, access to simple recording tools, or technical support, may be worth examining in future research, but their roles were not tested by this correlation.

Table 10b. Goat Raising Related Profile and Management Practices

Socio-demographic Profile	**Breeding**		**Feeding**		**Housing**		**Health**		**Marketing**		**Record Keeping**	
Herd Size	-0.094	0.053	-.230**	0.000	-0.067	0.173	-.283**	0.000	0.088	0.070	-0.078	0.111

Land Holding Size	0.005	0.919	-.196**	0.000	-0.069	0.159	-.184**	0.000	-0.023	0.635	-0.063	0.198
Own Herd	-0.062	0.203	-0.047	0.337	-0.017	0.724	-0.014	0.778	-0.061	0.212	0.041	0.403
Purchased Locally	0.005	0.924	0.059	0.229	0.083	0.089	0.033	0.501	0.043	0.377	0.063	0.199
Government Program	0.066	0.179	0.028	0.568	-.116*	0.017	0.018	0.711	-0.012	0.808	-.106*	0.029
Private Breeder	0.033	0.502	-0.018	0.706	0.042	0.386	-0.023	0.635	0.022	0.654	-0.006	0.909
Native	.135**	0.005	.149**	0.002	-0.044	0.371	.141**	0.004	-.102*	0.036	0.076	0.121

Continuation of Table 10b

Socio-demographic Profile	Breeding		Feeding		Housing		Health		Marketing		Record Keeping	
Anglo-Nubian	.147**	0.003	0.044	0.363	-.156**	0.001	-0.049	0.319	-.097*	0.048	-.104*	0.033
Boer	.169**	0.000	0.058	0.239	-.147**	0.003	-.103*	0.035	-0.090	0.064	-.118*	0.016
Crossbred	.139**	0.004	0.032	0.516	-.255**	0.000	-0.025	0.614	-.105*	0.031	-0.047	0.333
Upgraded	.120*	0.014	0.050	0.304	-.247**	0.000	-0.025	0.607	-0.091	0.062	-0.037	0.452
Member in Livestock Organization	0.127**	0.009	0.143**	0.003	0.098*	0.045	0.132**	0.006	0.156**	0.001	0.115*	0.017
**. Correlation is significant at the 0.01 level (2-tailed).												
*. Correlation is significant at the 0.05 level (2-tailed).												

Breeding Management

Goat Breeds

Native goats. The native-goat indicator showed a statistically significant weak positive relationship with breeding management (r = .135, p = .005). Ozaraga et al. (2018) described production-management systems and phenotypic characteristics of native goats in Capiz and Iloilo. Their study provides context on native-goat production but did not directly examine the correlation reported here.

Anglo-Nubian goats. The anglo-nubian goats indicator showed a statistically significant weak positive relationship with breeding management (r = .147, p = .003). Bondoc et al. (2018) examined genetic and phenotypic trends in milk-production traits among Anglo-Nubian goats in selected Philippine farms. This provides context for breed selection and management but does not directly explain the correlation.

Boer goats. The boer goat's indicator showed a statistically significant weak positive relationship with breeding management ($r = .169$, $p < .001$). Orden et al. (2016) reported production outcomes from a community-based selection and breeding program using Boer bucks. Although relevant to planned breeding, that study did not test the same relationship.

Crossbred goats. The crossbred goat's indicator showed a statistically significant weak positive relationship with breeding management ($r = .139$, $p = .004$). Orden et al. (2023) described natural breeding and concerns about uncontrolled mating among smallholder goat raisers in Central Luzon. This provides context for breeding management but does not directly explain the association.

Upgraded goats. The upgraded goat's indicator showed a statistically significant weak positive relationship with breeding management ($r = .120$, $p = .014$). Malvaz and Cabaral (2020) discussed goat genetic groups, including upgraded goats. This provides context for breed classification but does not directly explain the observed correlation.

Membership in a livestock organization. Membership in a livestock organization showed a statistically significant weak positive relationship with breeding management ($r = .127$, $p = .009$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Livestock organizations may provide channels for sharing practical guidance on stock selection, controlled mating, and reproductive records, but this correlation does not establish that membership caused differences in breeding management.

Non-significant relationships. Herd size, landholding size, owning one's herd, purchasing goats locally, obtaining goats from a government program, and sourcing goats from private breeders were not significantly

Feeding

Herd size. Herd size showed a statistically significant weak negative relationship with feeding management ($r = -.230$, $p < .001$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Liehr et al. (2024) identified land, labor, and capital constraints affecting adoption of improved husbandry practices in Lao PDR, while Orden et al. (2023) described variation in feeding practices among smallholder goat raisers in Central Luzon. These studies provide context but do not directly verify the association found.

Landholding size. Landholding size showed a statistically significant weak negative relationship with feeding management ($r = -.196$, $p < .001$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Liehr et al. (2024) identified land, labor, and capital constraints affecting adoption of improved husbandry practices in Lao PDR, while Orden et al. (2023) described variation in feeding practices among smallholder goat raisers in Central Luzon. These studies provide context but do not directly verify the association found.

Goat Breed

Native goats. The native-goat indicator showed a statistically significant weak positive relationship with feeding management ($r = .149$, $p = .002$). Orden et al. (2023) described traditional goat-raising and feeding practices among smallholder farmers in Central Luzon. This provides context for local production systems but does not directly establish the same breed-related association.

Membership in a livestock organization. Membership in a livestock organization showed a statistically significant weak positive relationship with feeding management ($r = .143$, $p = .003$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Organizational membership may be relevant to information access and farmer support, but the correlation alone does not establish the mechanism.

Non-significant relationships. Anglo-Nubian, Boer, crossbred, and upgraded goat indicators, as well as own-herd, local-purchase, government-program, and private-breeder source indicators, were not significantly related to feeding-management scores ($p > .05$).

Housing Management

Government-program source. Government-program source showed a statistically significant weak negative relationship with housing management ($r = -.116$, $p = .017$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. The sources in the current draft do not directly explain why this source or breed indicator was associated with housing-management scores.

Anglo-Nubian goats. Anglo-Nubian goats showed a statistically significant weak negative relationship with housing management ($r = -.156$, $p = .001$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. The sources in the current draft do not directly explain why this source or breed indicator was associated with housing-management scores.

Boer goats. Boer goats showed a statistically significant weak negative relationship with housing management ($r = -.147$, $p = .003$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. The sources in the current draft do not directly explain why this source or breed indicator was associated with housing-management scores.

Crossbred goats. Crossbred goats showed a statistically significant weak negative relationship with housing management ($r = -.255$, $p < .001$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. The sources in the current draft do not directly explain why this source or breed indicator was associated with housing-management scores.

Upgraded goats. Upgraded goats showed a statistically significant weak negative relationship with housing management ($r = -.247$, $p < .001$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. The sources in the current draft do not directly explain why this source or breed indicator was associated with housing-management scores.

Membership in a livestock organization. Membership in a livestock organization showed a statistically significant weak positive relationship with housing management ($r = .098$, $p = .045$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Livestock organizations may be channels for sharing practical information, but this weak association does not establish that membership caused differences in housing practices.

Non-significant relationships. Herd size, landholding size, own-herd source, local-purchase source, private-breeder source, and the native-goat indicator were not significantly related to housing-management scores ($p > .05$).

Health Management

Herd size. Herd size showed a statistically significant weak negative relationship with health management ($r = -.283$, $p < .001$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Ndwandwe et al. (2025) and Rupa and Portugaliza (2016) discuss goat-health practices and parasite-control challenges, while Panda et al. (2018) examined

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landholding among socioeconomic variables. These sources provide context but do not directly verify the correlation found.

Landholding size. Landholding size showed a statistically significant weak negative relationship with health management ($r = -.184$, $p < .001$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Ndwandwe et al. (2025) and Rupa and Portugaliza (2016) discuss goat-health practices and parasite-control challenges, while Panda et al. (2018) examined landholding among socioeconomic variables. These sources provide context but do not directly verify the correlation found.

Goat Breed

Native goats. The native-goat indicator showed a statistically significant weak positive relationship with health management ($r = .141$, $p = .004$). Rupa and Portugaliza (2016) highlighted the importance of parasite control among backyard goat raisers in Baybay City, Leyte. Their study did not establish that native-goat raisers necessarily had higher health-management scores.

Boer goats. The boer goat's indicator showed a statistically significant weak negative relationship with health management ($r = -.103$, $p = .035$). The cited literature in the current draft does not directly explain this breed-related association. It should not be attributed to assumed breed-specific health needs without direct evidence.

Membership in a livestock organization. Membership in a livestock organization showed a statistically significant weak positive relationship with health management ($r = .132$, $p = .006$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Ellorin et al. (2026) described limited formal training and technical support among backyard goat raisers in San Esteban, Ilocos Sur. This provides local context for extension support but does not directly establish the correlation found.

Non-significant relationships. Landholding-related and breed/source indicators not listed as significant including own-herd, local-purchase, government-program, private-breeder, Anglo-Nubian, crossbred, and upgraded categories were not significantly related to health-management scores ($p > .05$).

Marketing Management

Goat Breed

Native goats. The native-goat indicator showed a statistically significant weak negative relationship with marketing management ($r = -.102$, $p = .036$). The literature included in the current draft does not directly explain this breed-related association. It should be reported as an association, not as evidence that the breed causes differences in management scores.

Anglo-Nubian goats. The anglo-nubian goats indicator showed a statistically significant weak negative relationship with marketing management ($r = -.097$, $p = .048$). The literature included in the current draft does not directly explain this breed-related association. It should be reported as an association, not as evidence that the breed causes differences in management scores.

Crossbred goats. The crossbred goat's indicator showed a statistically significant weak negative relationship with marketing management ($r = -.105$, $p = .031$). The literature included in the current draft does not directly explain this breed-related association. It should be reported as an association, not as evidence that the breed causes differences in management scores.

Membership in a livestock organization. Membership in a livestock organization showed a statistically significant weak positive relationship with marketing management ($r = .156$, $p = .001$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding

used in the dataset. Livestock organizations may be channels for sharing market information and connecting raisers with buyers, but the correlation does not establish that membership caused better marketing management.

Non-significant relationships. Herd size, landholding size, own-herd source, local-purchase source, government-program source, private-breeder source, Boer goats, and upgraded goats were not significantly related to marketing-management scores ($p > .05$).

Record-Keeping Management

Government-program source. Government-program source showed a statistically significant weak negative relationship with record-keeping management ($r = -.106$, $p = .029$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Organizations may be channels for practical training in recording breeding, treatments, mortality, expenses, and sales, although this analysis does not establish that membership caused better record keeping.

Anglo-Nubian goats. Anglo-Nubian goats showed a statistically significant weak negative relationship with record-keeping management

($r = -.104$, $p = .033$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Organizations may be channels for practical training in recording breeding, treatments, mortality, expenses, and sales, although this analysis does not establish that membership caused better record keeping.

Boer goats. Boer goats showed a statistically significant weak negative relationship with record-keeping management ($r = -.118$, $p = .016$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Organizations may be channels for practical training in recording breeding, treatments, mortality, expenses, and sales, although this analysis does not establish that membership caused better record keeping.

Membership in a livestock organization. Membership in a livestock organization showed a statistically significant weak positive relationship with record-keeping management ($r = .115$, $p = .017$). The sign indicates the direction of association with the coded variable; interpretation as higher or lower scores depends on the coding used in the dataset. Organizations may be channels for practical training in recording breeding, treatments, mortality, expenses, and sales, although this analysis does not establish that membership caused better record keeping.

Non-significant relationships. Herd size, landholding size, own-herd source, local-purchase source, private-breeder source, and native, crossbred, and upgraded goat indicators were not significantly related to record-keeping scores ($p > .05$).

Goat Raiser Practiced Production Systems

Table 11 shows that distribution of goat raisers across four production systems. Intensive rearing is the most commonly practiced method at 28.10%, where goats are kept in enclosures and fully provided with all their needs. Tethering, the practice of tying animals in a specific area for grazing, accounts for 24.52% of respondents. Semi-intensive rearing, which combines confinement with some grazing time, makes up 23.81%, while extensive rearing where goats roam freely over wide areas with minimal supervision represent 23.57%.

Table 11. Goat Raising Practices

Type of production systems	Number of Respondents	%
Tethering	103	24.52

Extensive	99	23.57
Intensive	118	28.10
Semi-intensive	100	23.81
Total	**420**	**100**

Tethering was practiced by 24.52% of the respondents. This method is commonly adopted by smallholder goat raisers, particularly in areas where grazing spaces are limited. Similar findings were reported by Tongol et al. (2023), who found that 84.78% of backyard goat raisers in Negros Occidental tethered their goats within available pasture areas. Likewise, Siaboc and Cascon (2024) reported that tethering through rotational grazing was practiced by 72.73% of goat raisers in Catarman, Camiguin.

In addition, Intong (2019) found that 38.23% of backyard goat raisers in Northern Mindanao practiced rapid rotational tethering. These studies indicate that tethering remains a common management practice among smallholder goat raisers in different parts of the Philippines.

The extensive production system was practiced by 23.57% of the respondents. This system allows goats to graze on natural vegetation or available grazing areas with minimal inputs from raisers. This is consistent with the findings of Orden et al. (2023), who described smallholder goat production in Central Luzon as generally traditional and low input, relying on locally available resources. However, dependence on natural pasture may expose goats to fluctuations in forage availability and quality. Thus, maintaining available grazing areas, providing suitable shelter, and implementing regular health management practices are important to support goat production under this system.

The intensive production system was the most practiced among the respondents, accounting for 28.10%. This system generally involves keeping goats in confined areas or housing facilities, where feeding, watering, and health management are directly provided by the raisers. This allows closer monitoring of the animals and better control over their feeding and management. Similarly, Undong and Corpuz (2022), in their study of the Halal goat production system in Maguindanao, emphasized the importance of proper feeding management under intensive goat production. They reported that combining leguminous plants and grasses is a practical feeding option for goats under intensive management. However, this system may require greater labor, housing facilities, and feed resources compared with systems that rely more on grazing.

The semi-intensive production system was practiced by 23.81% of the respondents. This system combines limited grazing with supplementary feeding and partial housing, allowing raisers to balance natural grazing with closer animal supervision. This description is consistent with the findings of Orden et al. (2023), who reported traditional management practices and partial confinement among smallholder goat farms in Central Luzon. However, its implementation depends on the availability of land, labor, and feed resources.

The findings imply that goat raisers should adopt appropriate production and management practices based on their available land, labor, and feed resources. Proper housing, adequate feeding, regular grazing or tethering, and routine health care should be observed to maintain the health and productivity of their goats.

Goat Raiser Respondents of Production Performances in Terms of:

Initial Weight

Table 12 shows that most kids had an initial weight of 2.1–2.5 kg at birth, accounting for 38.10%. This was followed by 2.6–3.0 kg at 27.62% and 1.5–2.0 kg at 26.67%. Only a few kids weighed below 1.5 kg at 4.29% or above 3.0 kg at 3.33% at birth.

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Table 12. Initial Weight

Initial weight Group	Number of Respondents	%
Below 1.5 kg	18	4.29
1.5 – 2.0 kg	112	26.67
2.1 – 2.5 kg	160	38.10
2.6 – 3.0 kg	116	27.62
Above 3.0 kg	14	3.33
Total	**420**	**100.00**

The predominance of kids weighing 2.1–2.5 kg at birth, accounting for 38.10%, indicates that this was the most common birth-weight category in the study. This finding aligns with observations by Cruz et al. (2023) who reported that 2.0–2.5 kg is the typical birth-weight range for native and crossbred kids raised under backyard conditions in Central Luzon. Similarly, Mendoza and Ramos (2024) recorded that 36.7% of kids in smallholder farms in Tarlac fell within the 2.1–2.5 kg bracket, confirming that this weight range reflects prevailing local production conditions.

These Philippine-based results are consistent with the general observation by El-Raghi and Hashem (2022) that birth weight, litter size, maternal factors, and management conditions all influence the growth and survival of goat kids. El-Raghi and Hashem (2022) specifically emphasized that birth weight serves as a key indicator of early kid development, a principle that holds true even under local smallholder systems. Importantly, the present study did not directly measure factors such as doe nutrition during gestation, parity, or feeding regime; therefore, the observed distribution cannot be attributed solely to maternal or management influences.

The findings suggest that monitoring birth weight and ensuring adequate nutrition for pregnant does are essential for supporting healthy kid development. This recommendation is reinforced by Castillo-Gutierrez et al. (2022), who found that supplementing pregnant goats with methionine during the last third of gestation significantly increased kids' birth weight and improved their postnatal growth performance. Kids born with low birth weights may require closer observation and targeted care, such as priority access to colostrum and supplemental feeding, as recommended by PCAARRD (2023) in its technical guidelines for smallholder goat production.

Table 13. Kids Size Per Kidding (Litter Size)

Kids Size Per Kidding (Litter Size) Group	Number of Respondents	%
1 kid	141	33.57
2 kids	165	39.29
3 kids	86	20.48
4 kids	28	6.67
Total	**420**	**100.00**

The findings show that twin births were the most common followed by single births triplets and quadruplets. This pattern matches reports from smallholder farms in Central Luzon where Dela Cruz et al. (2022) recorded twinning rates of 37% to 41% among native and crossbred goats. Similarly, PCAARRD (2023) noted that twins

are the typical litter size under backyard management in the Philippines. Lima et al. (2020) added generally that litter size is a key reproductive trait that can improve with better breeding and management.

Triplets and quadruplets also occurred which shows good reproductive potential, but these carry higher care needs. Multiple births increase the nutritional demands placed on the doe and are often associated with lower individual birth weights among kids, potentially increasing the risk of early mortality. Robertson et al. (2020) emphasized that litter size, maternal nutritional status, and management practices are important factors influencing kid survival. Therefore, proper feeding, adequate colostrum intake, and close monitoring of newborn kids are particularly important in managing does with multiple births. These results imply that producers should give extra feed and close care to does carrying or raising multiple kids. Ensuring adequate nutrition colostrum access and shelter can help meet higher demands boost survival and turn good reproductive performance into faster herd growth and more income (PCAARRD, 2023).

Survival Rate

Table 14 presents the reported survival rates of goats among the respondents. The largest proportion reported a survival rate of 81–90%, accounting for 30.95%, closely followed by those reporting above 91% at 30.48%. Meanwhile, 17.38% reported survival rates of 71–80%, 11.43% reported 60–70%, and 9.76% reported below 60%. These findings indicate that most respondents reported relatively high survival rates among their goats.

Table 14. Survival Rate

Survival Rate Group	Number of Respondents	%
Below 60%	41	9.76
60 – 70%	48	11.43
71 – 80%	73	17.38
81 – 90%	130	30.95
Above 91%	128	30.48
Total	**420**	**100.00**

These findings indicate that many raisers reported high kid survival, but some still experienced low survival rates. According to Orden *et al.* (2023), survival rates of 80–90% indicate good performance under backyard production conditions, while lower rates may reflect challenges in nutrition, housing, sanitation, and health management.

Similarly, Manalili *et al.* (2020) reported survival rates of 80–92% among improved dairy goat farms, providing a comparative benchmark for the present findings. The proportion of respondents achieving survival rates above 80% suggests favorable kid survival among many raisers. However, those recording lower rates may need to strengthen feeding practices, provide adequate shelter, and improve preventive health care.

The finding that nearly one-third of respondents achieved survival rates above 90% is encouraging because it demonstrates the potential for high kid survival under local production conditions. Mellado *et al.* (2019) emphasized the importance of early-life care, particularly adequate colostrum intake and hygiene, while Greyling (2017) discussed the management challenges associated with larger litters.

The findings imply that improving kid survival requires continued attention to newborn care, adequate feeding, proper housing, and disease prevention. Adopting these practices may help reduce kid losses, sustain herd growth, and improve overall production performance.

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Approximate Weight at Three Months

Table 15 shows the approximate weight of goat kids at three months of age. The largest proportion of respondents reported kids weighing 11–13 kg at 36.43%. This was followed by 14–16 kg at 27.38% and 8–10 kg at 27.14%. Kids weighing above 16 kg made up 5.48%, while only 3.57% weighed below 8 kg.

Table 15. Approximate Weight at Three Months

Approximate weight at three months old Group	Number of Respondents	%
Below 8 kg	15	3.57
8 – 10 kg	114	27.14
11 – 13 kg	153	36.43
14 – 16 kg	115	27.38
Above 16 kg	23	5.48
Total	**420**	**100**

This indicates that the largest proportion of respondents reported that their goat kids weighed within this range at three months of age. However, this finding differs from the mean three-month weight of 7.72 ± 0.62 kg reported by Orden et al. (2023) among smallholder goat farms in Central Luzon, Philippines. Meanwhile, Intong et al. (2019) reported an average three-month weight of 10.64 kg among backyard goats in Northern Mindanao, with provincial averages ranging from 9.41 to 12.70 kg. These Philippine studies indicate that goat growth performance may vary across production settings due to differences in breeds, feeding and management practices, and other farm conditions. It should also be noted that the present study used respondent-reported weight categories rather than calculating the mean weight from individually measured goats. Therefore, the findings are not directly equivalent to the average weights reported in previous studies.

This implies that goat raisers should regularly monitor the weight of their kids to assess their growth and identify animals that may require improved feeding and additional care.

Average Selling Price

Table 16 shows that the largest proportion of respondents sold their goats at an average price of ₱3,501–₱4,500, accounting for 32.86%. This was followed by ₱2,501–₱3,500 at 30.71% and ₱4,501–₱5,500 at 29.05%. Meanwhile, 4.29% sold their goats for below ₱2,500, while only 3.10% received an average selling price above ₱5,500.

Table 16. Average Selling Price

Average selling price Group	Number of Respondents	%
Below ₱2,500	18	4.29
₱2,501 – ₱3,500	129	30.71

₱3,501– ₱4,500	138	32.86
₱4,501 – ₱5,500	122	29.05
Above ₱5,501	13	3.10
Total	**420**	**100.00**

This indicates that most respondents sold their goats within the price range of ₱2,501 to ₱5,500. A similar finding was reported by Orden et al. (2023), who found that slaughter goats in Central Luzon were commonly sold for ₱3,000 to ₱5,000 per head, while breeder goats were sold for higher prices. This suggests that the selling prices reported by the respondents are comparable to those observed in other smallholder goat production areas in Central Luzon.

Moreover, Yitayew et al. (2019) and Ahmad et al. (2019) emphasized that goat prices are influenced by animal characteristics such as live weight, age, sex, and body condition, as well as buyer preferences and market conditions. These factors may help explain the differences in selling prices reported by the respondents.

Months Before Selling

Table 17 shows that the largest proportion of respondents 36.43% sold their goats at 7–8 months of age. This was followed by 9–10 months 27.38% and 5–6 months 24.52%. Overall, 63.81% sold their goats between 7 and 10 months.

Table 17. Months Before Selling

Months before selling Group	Number of Respondents	%
3 – 4 months	26	6.19
5 – 6 months	103	24.52
7 – 8 months	153	36.43
9 – 10 months	115	27.38
More than 10 months	23	5.48
Total	**420**	**100**

The findings revealed that most respondents sell their goats after 7–8 months at 36.43%, followed by 9–10 months at 27.38%. This indicates that most goat raisers allow their animals to grow for several months before selling them. A similar finding was reported by Porciuncula and Padilla (2017), who observed that slaughter goats in the Central Luzon supply chain were generally sold at 8–10 months of age, with live weights ranging from 15 to 20 kilograms. This suggests that the selling period observed in the present study is comparable to the marketing practices in other parts of Central Luzon. Furthermore, Orden et al. (2023) reported an increase in the average weight of goats from 7.72 kilograms at three months to 15.49 kilograms at six months, emphasizing the importance of growth and development in goat production. These findings suggest that the age and physical development of goats are important considerations before marketing. Therefore, goat raisers should monitor the growth, body weight, and physical condition of their animals to determine an appropriate selling period and respond to market requirements.

Relationship Between the Management Practices and Production Performance

Table 18a presents the relationship between management practices and overall production performance among smallholder goat raisers. The results revealed that none of the six management practice domains had a statistically significant relationship with overall production performance. Breeding Management (r = .064, p = .190), Feeding Management (r = .029, p = .559), Housing Management (r = −.017, p = .730), Health Management (r = −.025, p = .615), Marketing Management (r = .040, p = .418), and Record Keeping (r = −.057, p = .241) all had p-values greater than the .05 level of significance.

Table 18a. Relationship Between Management Practices and Production Performances

Management Practices	**Production Performances**	
	Computed r	**P-value**
Breeding Management	0.064	0.19
Feeding Management	0.029	0.559
Housing Management	-0.017	0.73
Health Management	-0.025	0.615
Marketing Management	0.04	0.418
Record Keeping	-0.057	0.241
**. Correlation is significant at the 0.01 level (2-tailed).		
*. Correlation is significant at the 0.05 level (2-tailed).		

The correlation coefficients were close to zero, indicating negligible linear associations between the individual management practice scores and overall production performance.

Therefore, the null hypotheses stating that there were no significant relationships between each management practice domain and overall production performance were not rejected. However, these findings do not prove that no relationships exist in the population, nor do they imply that management practices are unimportant to goat production.

Breeding

Breeding management showed a very weak positive relationship with overall production performance (r = .064, p = .190), suggesting that higher breeding management scores were associated with only a negligible increase in the overall performance score. However, this association was not statistically significant. Orden et al. (2023), in their assessment of smallholder goat production systems in Central Luzon, reported that uncontrolled natural breeding was commonly practiced and that the age of the buck at first breeding was significantly associated with conception rate.

Their findings emphasize that specific breeding practices may influence reproductive outcomes. This suggests that examining individual reproductive indicators, rather than relying solely on an overall production performance score, may provide a clearer understanding of the contribution of breeding management to goat production.

Feeding

Feeding management had a very weak positive relationship with overall production performance (r = .029, p = .559). The near-zero coefficient indicates that variations in feeding management scores were minimally associated with differences in overall production performance. Although no significant relationship was observed, proper nutrition remains an essential consideration in maintaining animal growth and productivity. Orden et al. (2023) discussed management and production practices among smallholder goat raisers in Central Luzon, while Siaboc and Cascon (2024) examined feeding practices alongside housing and health management among goat raisers in Catarman, Camiguin.

These studies highlight the role of feeding as part of an integrated production system. The findings suggest that feeding practices may be better examined in relation to specific indicators, such as body weight gain and animal growth, to determine their contribution to productivity.

Housing

Housing management demonstrated a very weak negative relationship with overall production performance (r = −.017, p = .730). The coefficient was almost zero, indicating a negligible association between the two variables. This result does not suggest that housing improvements negatively affect goat production. Rather, housing management scores did not show a meaningful linear association with the overall performance measure in this study. Orden et al. (2023) documented variations in management practices among smallholder goat raisers in Central Luzon, while Siaboc and Cascon (2024) also considered housing conditions in their assessment of goat-raising practices in Camiguin. Their studies demonstrate the relevance of housing within smallholder production systems. However, its contribution to production may be more evident when evaluated through specific indicators, such as animal health, comfort, and survival.

Health

Health management exhibited a very weak negative relationship with overall production performance (r = −.025,

p = .615), indicating that differences in health management scores were barely associated with variations in the overall production performance score. Despite this result, animal health remains an important consideration in maintaining a productive goat herd. Orden et al. (2023) discussed management practices relevant to smallholder goat production, while Siaboc and Cascon (2024) examined health-related practices among goat raisers in Camiguin. These studies provide context for the importance of incorporating animal health practices into goat production management. In addition, the relationship between health management and specific indicators, particularly survival rate, may be examined separately to determine whether health-related practices are more closely associated with animal survival than with overall production performance.

Marketing

Marketing management showed a very weak positive relationship with overall production performance (r = .040, p = .418), indicating that the association between the two variables was negligible and not statistically significant. Nevertheless, marketing practices remain important in determining the economic returns of goat production. Parilla et al. (2022), in their study of the goat supply chain in Northwestern Leyte, identified different marketing channels, including individual farmers, registered associations, and auction markets. Their findings highlighted the importance of organized marketing systems and efficient supply chain operations in improving opportunities for goat raisers. Similarly, Neupane et al. (2023) found that goat farmers who participated in cooperatives and had access to market price information obtained better selling prices.

These findings suggest that marketing strategies, market access, and price information can influence the economic benefits received by goat raisers.

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Record Keeping

Record keeping had a very weak negative relationship with overall production performance (r = −.057, p = .241), indicating that the two variables had a negligible association in the present analysis. This finding does not mean that maintaining farm records is disadvantageous. Alcedo et al. (2015) examined stockmanship competence among backyard goat raisers in the Philippines, covering management areas such as housing, feeding, breeding, and health and husbandry.

Their study reported improvements in stockmanship competence and production-related outcomes following participation in an integrated goat management training program. Although their research did not directly examine record keeping, it highlights the value of improving farmers' management knowledge and practices. In actual farm operations, recording breeding schedules, kidding activities, animal survival, health treatments, expenses, and sales can help goat raisers monitor herd performance and make informed decisions. Thus, the practical importance of record keeping extends beyond its statistical relationship with the overall production performance measure.

Table 18b. Relationship Between Production System and Management Practices

Production System	Breeding		Feeding		Housing		Health		Marketing		Record Keeping	
	Computed r	P-value	Computed r	P-value	Computed r	P-value	Computed r	P-value	Computed r	P-value	Computed r	P-value
Tethering	0.003	0.947	−.052	0.292	−.106*	0.030	−.092	0.059	−.055	0.265	0.065	0.186
Extensive	0.058	0.233	0.048	0.331	0.075	0.123	0.031	0.530	−.005	0.917	0.030	0.537
Intensive	−.105*	0.032	−.072	0.142	−.009	0.854	0.077	0.117	0.049	0.317	−.060	0.223
Semi-intensive	0.055	0.260	0.082	0.092	0.036	0.461	−.011	0.819	0.004	0.927	−.020	0.676
**. Correlation is significant at the 0.01 level (2-tailed).												
*. Correlation is significant at the 0.05 level (2-tailed).												

Pearson's r correlation analysis was conducted to determine the relationship between the respondents' production systems and their management practices in terms of breeding, feeding, housing, health, marketing, and record keeping. The results revealed that most of the relationships were not statistically significant. Out of the 24 correlations examined, only two significant relationships were identified: tethering had a significant negative relationship with Housing Management (r = −.106, p = .030), while intensive production had a significant negative relationship with Breeding Management (r = −.105, p = .032). Although statistically significant, both relationships were very weak, indicating that the associations between these production systems and the corresponding management practices were limited.

Tethering

Tethering showed no significant relationship with Breeding Management (r = .003, p = .947), Feeding Management (r = −.052, p = .292), Health Management (r = −.092, p = .059), Marketing Management (r = −.055, p = .265), and Record Keeping (r = .065, p = .186). However, a significant negative relationship was observed between tethering and Housing Management (r = −.106, p = .030). This indicates a very weak inverse association between tethering and housing management scores. One possible explanation is that tethering allows goats to remain in designated outdoor grazing areas, which may reduce the reliance of raisers on permanent housing facilities. Siaboc and Cascon (2024) examined tethering and other management practices among smallholder goat raisers in Catarman, Camiguin, highlighting the different approaches used in managing goats under smallholder conditions. Similarly, Orden et al. (2023) documented variations in management practices among smallholder goat raisers in Central Luzon.

Extensive

Extensive production showed no significant relationship with Breeding Management (r = .058, p = .233), Feeding Management (r = .048, p = .331), Housing Management (r = .075, p = .123), Health Management (r = .031, p = .530), Marketing Management (r = −.005, p = .917), and Record Keeping (r = .030, p = .537). These results indicate that the adoption of an extensive production system was not significantly associated with differences in any of the six management practice domains. This suggests that the use of an extensive system alone does not necessarily determine how raisers implement their management practices.

Orden et al. (2023) discussed variations in management practices and production characteristics among smallholder goat raisers in Central Luzon, demonstrating the importance of considering farm conditions and management approaches in evaluating goat production systems. The present findings further suggest that management practices should be assessed independently of the production system being used.

Intensive

Intensive production exhibited a significant negative relationship with Breeding Management (r = −.105, p = .032), although the association was very weak. This indicates that respondents practicing intensive production tended to have slightly lower breeding management scores, based on the coding used in the analysis. However, no significant relationships were observed with Feeding Management (r = −.072, p = .142), Housing Management (r = −.009, p = .854), Health Management (r = .077, p = .117), Marketing Management (r = .049, p = .317), or Record Keeping (r = −.060, p = .223).

The negative association suggests that adopting an intensive production system does not automatically correspond to better breeding management. Although intensive production involves keeping goats under a more controlled management arrangement, this does not necessarily guarantee proper breeder selection, controlled mating, reproductive monitoring, and appropriate breeding schedules. Orden et al. (2023) reported that uncontrolled natural breeding remained a common practice among smallholder goat raisers in Central Luzon, highlighting the need to improve specific reproductive management practices.

Semi-Intensive

Semi-intensive production had no significant relationship with Breeding Management (r = .055, p = .260), Feeding Management (r = .082, p = .092), Housing Management (r = .036, p = .461), Health Management (r = −.011, p = .819), Marketing Management (r = .004, p = .927), and Record Keeping (r = −.020, p = .676). These findings indicate that the use of a semi-intensive production system was not significantly associated with variations in the six management practice domains.

Siaboc and Cascon (2024) examined feeding, housing, and health management practices among smallholder goat raisers in Catarman, Camiguin, emphasizing the different management considerations involved in goat production. Similarly, Orden et al. (2023) discussed management practices and production characteristics among smallholder goat raisers in Central Luzon.

The findings suggest that production systems have limited relationships with the management practices of goat raisers. Only two significant but very weak relationships were found, while the remaining correlations were not significant. This implies that the production system alone does not determine how farmers manage their goats. Other factors, such as farmers' knowledge, experience, and available resources, may also influence their management practices. Therefore, providing proper training and technical assistance may help improve goat management and production.

Major Problems and Constraints Smallholder Raisers Encountered in Management Practices

Table 19a presents that the study assessed the major constraints faced by goat raisers in Ilocos Norte, rated on a scale where higher scores indicate greater severity.

Table 19a. Problem and Constraints in Management Practices

Indicators	Mean	Descriptive Rating
1. Shortage of quality feeds during dry season	4.69	Very Serious
2. Limited access to breeding bucks or quality stock	4.70	Very Serious
3. Lack of veterinary services or medicines	4.02	Serious
4. Lack of capital for housing or feeds	3.95	Serious
5. Low market price for live goats or meat	4.06	Serious
6. Lack of land for pasture or forage production	4.01	Serious
7. Vaccines and medicines are sometimes unavailable in my area	4.32	Very Serious
8. I lack knowledge or training in improved breeding practices.	4.26	Very Serious
9. Sometimes I do not have enough time to record daily goat management activities.	4.36	Very Serious
10. I rely on memory instead of written records, which leads to errors in farm decision-making.	4.42	Very Serious
Overall Mean	**4.27**	**Very Serious**

All listed problems were rated as serious to very serious, with an overall mean of 4.27, described as very serious. Closely following were reliance on memory instead of written records, leading to errors in decision-making mean of 4.42, lack of time to record daily management activities mean of 4.36, and unavailability of vaccines and medicines mean of 4.32, all also rated very serious. Furthermore, lack of knowledge or training in improved breeding practices scored 4.26 described as very serious. The remaining issues low market price for live goats or meat mean of 4.06, lack of veterinary services or medicines mean of 4.02, lack of land for pasture or forage production mean of 4.01, and lack of capital for housing or feeds 3.95 were all rated serious.

The findings revealed that limited access to breeding bucks or quality breeding stock obtained the highest mean of 4.70, described as Very Serious. This was closely followed by the shortage of quality feeds during the dry season, with a mean of 4.69. These results indicate that access to suitable breeding animals and a sufficient supply of nutritious feeds are major concerns among goat raisers. Similarly, Orden et al. (2023) reported that smallholder goat farms in Central Luzon experienced unmanaged breeding practices and inadequate feeding programs. The Philippine Small Ruminants Industry Roadmap (2022–2040) also identified the limited availability of quality breeder bucks and seasonal forage supply as challenges affecting the goat industry.

The unavailability of vaccines and medicines received a mean of 4.32, while the lack of veterinary services or medicines obtained a mean of 4.02. Both were identified as serious concerns. These findings highlight the difficulties experienced by goat raisers in obtaining timely animal health services and necessary veterinary supplies. Sanchez et al. (2020) identified disease occurrence and limited veterinary services as among the challenges faced by goat raisers in SOCCSKSARGEN. Likewise, Orden et al. (2023) emphasized that the absence of a sound health management program increases the vulnerability of goats to diseases.

Lack of knowledge or training in improved breeding practices also received a very serious rating, with a mean of 4.26. This suggests that some raisers may need additional guidance in applying appropriate breeding methods. Undong and Corpuz (2022), in their study of the Halal goat production system in Maguindanao, reported gaps in farmers' knowledge of recommended feeding and housing practices. In addition, Ellorin et al. (2026) found

that limited formal training and technical knowledge were among the concerns affecting backyard goat management in San Esteban, Ilocos Sur.

Record-keeping constraints were also rated very serious. The lack of time to record daily goat management activities obtained a mean of 4.36, while reliance on memory instead of written records received a mean of 4.42. These findings suggest that maintaining farm records may be difficult for some raisers. Ellorin et al. (2026) also reported limited training and technical support among backyard goat raisers in Ilocos Sur. These findings emphasize the need to introduce simple and practical recording methods that farmers can easily incorporate into their daily activities.

Other constraints included low market prices for live goats or meat mean of 4.06, lack of land for pasture or forage production mean of 4.01, and lack of capital for housing or feeds mean of 3.95. Although these were rated serious rather than very serious, they may still affect the ability of raisers to maintain and improve their goat-raising activities. The Philippine Small Ruminants Industry Roadmap (2022–2040) identified weaknesses in smallholder marketing and seasonal forage availability as concerns in the industry. Similarly, Ellorin et al. (2026) reported limited capital and insufficient technical support among backyard goat raisers in Ilocos Sur.

Overall, the results indicate that goat raisers experience several serious constraints involving breeding resources, feed availability, animal health services, technical knowledge, record keeping, and financial resources. These findings suggest the importance of providing accessible breeding services, forage production support, veterinary assistance, practical training, and simplified farm-recording methods. Strengthening these support services may help address the challenges experienced by goat raisers and improve their management practices.

Production Performance

Table 19b shows that the regarding constraints affecting production performance, the overall mean was 4.41, described as very serious, indicating that the identified problems directly limit productivity.

Table 19b. Problems and Constraints Affecting Production Performance

Indicators	Mean	Descriptive Rating
1. Shortage of quality feeds affects the weight gain of kids at three months old.	4.68	Very Serious
2. Slow growth of goats increases the number of months before selling.	4.69	Very Serious
3. Poor nutrition of breeding does affect the number of kids born per kidding.	4.21	Serious
4. Diseases and infections contribute to kid mortality.	4.25	Serious
5. Poor nutrition of pregnant does contributes to low birth weight of kids.	4.24	Serious
6.Low average selling prices reduce the income obtained from goat production.	4.37	Very Serious
Overall Mean	**4.4**	**Very Serious**

The most critical impacts were slow growth that increases the number of months before selling 4.69 rating of very serious and shortage of quality feeds that affects the weight gain of kids at three months old 4.68 described as very serious, which implies that inadequate nutrition directly slows growth, prolongs production cycles, and delays potential income. Low average selling prices that reduce income obtained from goat production 4.37

described as very serious further shows that even when animals reach marketable weight, unfavorable pricing erodes profitability and discourages reinvestment. Meanwhile, diseases and infections that contribute to kid mortality 4.25 described as serious, poor nutrition of pregnant does that leads to low birth weight 4.24 described as serious, and poor nutrition of breeding does that affects the number of kids born per kidding 4.21 described as serious demonstrate that gaps in health management and maternal nutrition directly undermine survival, reproductive performance, and early growth outcomes.

The high ratings for feed shortage and slow growth emphasize the importance of proper nutrition in improving goat growth and production performance. Orden et al. (2023) reported that smallholder goat farms in Central Luzon commonly practiced traditional feeding methods and had inadequate feeding programs. Their study also recorded average goat weights of 7.72 kg at three months and 15.49 kg at six months, indicating the importance of improving feeding management to support growth. Similarly, the Department of Science and Technology–Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD, 2017) highlighted the importance of appropriate feed supplements and feeding schemes in improving kid survival and growth. These findings support the need for sufficient and nutritious feeds to help goats achieve better growth and reach marketable weight.

Nutrition is also important in the reproductive performance of does and the survival of their offspring. DOST-PCAARRD (2017) reported that improved feeding programs for pregnant and lactating does help support reproductive performance, kid survival, and growth. The development of appropriate feed supplements for newborn and pre-weaning kids also helped improve their survival and development. In addition, Orden et al. (2023) emphasized that inadequate feeding programs and poor health management were among the concerns affecting smallholder goat production. These findings highlight the importance of proper maternal nutrition and preventive health management in improving birth outcomes and reducing kid mortality.

Marketing conditions also influence the income obtained from goat production. The mean of 4.37 for low average selling prices indicates that unfavorable prices are a serious concern among the respondents. The DOST-PCAARRD (2017) article on goat production in the Philippines discussed the industry's production and market situation, including the need to improve productivity to meet market demand. This suggests that improving production performance should be accompanied by appropriate marketing support to help raisers obtain better returns from their animals.

CONCLUSION

Based on the findings of the study, the following conclusions were drawn:

1. Profile of Smallholder Goat Raisers.

Smallholder goat raisers in Ilocos Norte represent various age groups, with young adults comprising the largest group. Male and female respondents were almost equally represented. Most were married, had completed high school, and had more than ten years of farming experience. However, the majority had not attended goat-raising seminars or training. Their income from goat raising varied, with the largest group earning between ₱3,001 and ₱5,000. Farming was the most common primary source of income, while most respondents maintained small goat herds and operated on limited landholdings. Native goats were the most commonly raised, and many respondents obtained their stocks from their own herds or local sources. Most were also not members of livestock organizations. These characteristics highlight the importance of accessible training, practical technical assistance, improved management practices, and stronger participation in livestock organizations to help smallholder goat raisers improve production, make efficient use of available resources, and support the sustainability of their goat-raising enterprises.

2. Management Practices of Smallholder Goat Raisers.

Smallholder goat raisers in Ilocos Norte demonstrated varying levels of management practices across the six

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domains of goat production. Housing practices were the most commonly observed, followed by feeding and health management, while marketing and breeding practices received lower ratings. Record keeping was the least practiced management domain, indicating that systematic documentation of farm activities and goat production records may need greater attention. Specific gaps were also noted in breeding-stock selection, controlled mating, rotational grazing, and the use of preventive health measures. These findings highlight the need for practical training and technical assistance to strengthen breeding, feeding, housing, health, and marketing practices, while promoting consistent record keeping. Improving these management areas may help goat raisers make better production decisions, use available resources more efficiently, and support more sustainable smallholder goat production.

3. Relationship Between Socio-demographic Profile and Management Practices.

The findings revealed that selected socio-demographic characteristics of smallholder goat raisers were significantly associated with certain management practices, particularly in breeding, feeding, housing, health, marketing, and record keeping. However, these associations varied across the different profile characteristics and management domains, indicating that not all characteristics were significantly related to every management practice. These findings suggest that the management practices of goat raisers may differ according to their individual and socioeconomic circumstances. Thus, extension programs and technical assistance should consider the varied backgrounds and needs of goat raisers to provide more appropriate training and support for improving goat management practices.

4. Production Systems Practiced by Smallholder Goat Raisers.

Smallholder goat raisers in Ilocos Norte practiced different goat production systems, namely intensive, tethering, semi-intensive, and extensive systems. The intensive system was the most commonly practiced, followed by tethering, semi-intensive, and extensive systems. This indicates that goat raisers used varying approaches to managing their herds, which may reflect differences in available resources, farm conditions, and management preferences. The presence of these different systems highlights the importance of providing practical guidance suited to each production system to help raisers improve animal management, utilize available resources efficiently, and support sustainable goat production.

5. Production Performance of Smallholder Goat Raisers

The production performance of smallholder goat raisers in Ilocos Norte was assessed in terms of approximate weight, weight at three months, months before selling, kid size or litter size, survival rate, initial weight, and average selling price. These indicators provide an overview of the growth, reproductive performance, survival, and market value of goats raised by the respondents. Evaluating these aspects is important in identifying production strengths and areas that may require improvement. Regular monitoring of goat weight, litter size, kid survival, and selling price may help raisers make informed management and marketing decisions, improve production efficiency, and support the sustainability of their goat-raising enterprises.

6. Relationship Between Management Practices, Production Performance, and Production Systems.

a. Relationship Between Management Practices and Production Performance.

The findings revealed that there were no statistically significant relationships between the six management practice domains and the overall production performance of smallholder goat raisers. This indicates that the study did not establish significant linear associations between breeding, feeding, housing, health, marketing, and record keeping practices and overall production performance. However, this does not mean that these practices are unimportant, as production outcomes may also be related to other factors not covered by the analysis. Continued improvement in management practices remains important in supporting efficient and sustainable goat production.

b. Relationship Between Production System and Management Practices.

The findings showed that only selected relationships between production systems and management practices

were statistically significant. The tethering system was significantly associated with housing practices, while the intensive system was significantly associated with breeding practices. The other relationships examined were not statistically significant. These results suggest that certain management practices may vary in association with the production system used by goat raisers. Therefore, training and technical assistance may be more effective when management recommendations are adapted to the specific production systems and needs of smallholder goat

7. Major Problems and Constraints Encountered by Smallholder Goat Raisers.

Smallholder goat raisers in Ilocos Norte encountered various problems and constraints in goat management practices and production performance, all of which were rated as serious to very serious. These challenges covered breeding, feeding, housing, health, marketing, record keeping, and other aspects of goat production. Feed shortages, limited pasture and forage areas, animal growth and survival concerns, low market prices, limited access to veterinary supplies, and difficulties in maintaining farm records were among the concerns that may hinder efficient goat production. The overall findings indicate that these challenges require appropriate attention and practical interventions. Strengthening technical assistance, improving access to feed resources and animal health services, promoting appropriate marketing strategies, and encouraging systematic record keeping may help address these constraints and support more efficient and sustainable smallholder goat production.

8. Proposed Management and Policy Interventions to Improve Efficiency and Sustainability.

Based on the findings, proposed management and policy interventions should address the identified gaps in breeding, feeding, housing, health, marketing, and record keeping, as well as the serious to very serious constraints encountered by smallholder goat raisers. Priority should be given to practical training and hands-on demonstrations on breeding-stock selection, controlled mating, sustainable feed and forage production, proper housing and sanitation, preventive animal health care, appropriate marketing practices, and systematic record keeping. Policy support may also focus on improving access to technical assistance, veterinary services, and locally available feed resources. These interventions may help goat raisers use available resources more efficiently, strengthen their management practices, address production constraints, and support the long-term sustainability of smallholder goat production in Ilocos Norte.

RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations are proposed:

1. Strengthen Goat Management Training. Smallholder goat raisers in Ilocos Norte are encouraged to participate in regular training and hands-on demonstrations covering breeding, feeding, housing, health, marketing, and record keeping. Greater emphasis should be placed on proper breeding-stock selection, preventive animal health care, appropriate housing and sanitation, and systematic recording of farm activities.

2. Promote Sustainable Feed and Forage Production. Goat raisers are encouraged to establish and utilize locally available feed resources and forage crops to help address feed shortages and make efficient use of available land and resources.

3. Improve Production Monitoring and Record Keeping. Goat raisers should regularly monitor animal growth, litter size, kid survival, and selling prices. Maintaining accurate farm records may support informed management decisions and improve production and marketing practices.

4. Strengthen Extension and Veterinary Services. Relevant agricultural offices and local government units may consider providing accessible technical assistance, veterinary support, and practical learning opportunities suited to the needs and conditions of smallholder goat raisers.

5. Support Market Access and Livestock Organization Participation. Programs may promote improved access to markets and encourage goat raisers to participate in livestock organizations to facilitate information sharing, learning opportunities, and access to available support services.

6. Conduct Further Research on Production Performance. Since the study found no statistically significant relationships between the six management practice domains and overall production performance, future studies may examine other factors associated with production outcomes, including breed, nutrition, disease occurrence, and environmental conditions.

These recommendations may help address the identified constraints, strengthen farm management, and support the long-term efficiency and sustainability of smallholder goat production in Ilocos Norte.

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