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Socio-demographic Characteristics, Production and Management Practices, and Economic Utility of the Sinirangan Native Pig (*Sus scrofa* L.)

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ABSTRACT
Sinirangan native pig (SNP) is an indigenous livestock breed that plays an important role in the livelihoods and cultural traditions of rural communities in Eastern Samar, Philippines. However, studies on the socio-demographic profile, production management practices, and economic utility of the Sinirangan native pig are limited. This study aimed to determine the profile of SNP raisers, evaluate their production and breeding practices, and understand the economic importance of this local swine breed. A researcher-made questionnaire was used to collect data from 23 SNP raisers in Eastern Samar. The findings reveal an aging demographic, with majority of raisers being middle-aged (21.74%) and elderly (34.78%), and limited participation from younger individuals, which raises about SDG8 (Decent work and economic growth) and the long-term sustainability of SNP industry. Relatives and friends provided the primary source of initial knowledge on SNP raising, and a significant proportion of raisers had not attended any formal training or seminars. The production practices showed suboptimal health management, with low vaccination rates and reliance on commercial/synthetic dewormers indicating a need for improved SDG2 (Zero hunger) practices. Raisers also faced high feed costs and limited technical knowledge that hinders SDG12 (Responsible consumption and production). Breeding practices were predominantly traditional, with lack of systematic record-keeping and limited use of selective breeding approaches. Furthermore, marketing of SNPs was primarily through middlemen, with lechon as the main product, thereby highlighting the niche demand for this local delicacy. However, findings suggest the need for targeted interventions to address the identified gaps and support the long-term sustainability and development of the Sinirangan native pig industry. Recommendations include knowledge dissemination, technology adoption, herd management improvements, and market diversification strategies to empower SNP raisers and ensure the conservation of this valuable genetic resource.

KEYWORDS
Sinirangan native pig, native pig raisers, production practices

1. Introduction

Sinirangan native pig (SNP) is an indigenous livestock breed developed in Eastern Samar and is known to provide a valuable financial and sustainable livelihood opportunity for resource-poor rural farmers in Region 8 (Dacules and Afable, 2020; Cayubit, 2015). Beyond its economic benefits, SNP also plays an important role in the socio-cultural activities and traditions of the Philippines, particularly during cultural festivities and ceremonies (DOST-PCAARRD, 2017). To help promote the conservation of indigenous animals, Republic Act 9147 and 8435 in alignment with Sustainable Development Goals (SDG) of the

United Nations (UN), aims in the promotion of the conservation and sustainable use of the country's genetic resources, including native pigs. Senate Bill No. 1344 supports this, which seeks to promote the scientific breeding, processing, use, and advancement of native animals in the Philippines to enhance agricultural productivity and stimulate rural development. In addition, the Visayas Consortium for Agriculture and Natural Resources Program (ViCARP) identified native pigs as a priority commodity for sustainable agriculture and rural development in the Visayas region, potentially providing income for smallholder farmers and enhancing food security by providing a wider range of food sources. Although studies on Philippine native pigs have been conducted (Banayo, et al., 2023; Falculan, 2021; Dacules and Afable, 2020; Villanueva and Sulabo, 2018), socio-demographic, production management practices, and economic utility studies of the Sinirangan native pigs are insufficient. Thus, this study seeks to contribute to the broader understanding of the Sinirangan native pig by determining the socio-demographic profile of SNP raisers, evaluating their production practices, assessing their breeding management, and examining the economic utility of the Sinirangan native pig. Furthermore, the findings of this study can provide evidence-based recommendations for policymakers, extension services, and other stakeholders involved in the conservation and promotion of this local swine breed, ultimately supporting the livelihoods of the local pig raisers and ensuring the long-term preservation of this valuable genetic resource.

2. Methodology

2.1 Researcher-made Questionnaire

A three parts researcher-made questionnaire was used in this study. The first part covers the socio-demographic profile of the Sinirangan native pig raisers such as age, sex, civil status, educational attainment, number of years as raiser, source of income and capital and the reasons and problems in raising Sinirangan native pigs. The second part includes the production and management of raising Sinirangan native pigs such as knowledge and information in raising Sinirangan native pigs. The third part covers the economic importance of SNP among raisers. Marketing and marketing practices of Sinirangan native pig raisers were also included. The questionnaire was pre-tested before the conduct of the study to ensure its clarity and effectiveness in gathering information.

2.2 Respondents of the Study

The study was conducted in Eastern Samar, Philippines. Study area was selected based on the location of the SNP raisers identified by the Eastern Samar State University, Sinirangan Native Pig Center. The study involved total enumeration of the 23 respondents. Briefing of the content and extent of the research was conducted beforehand.

2.3 Ethical Consideration

Approval of the University Ethics Review Committee (2024-47-CA) was secured for this study.

2.4 Data Analysis

The study used descriptive statistics such as mean, frequency counts, and percentages to analyze the data. Weighted mean was used to give the quantities being averaged their proper degree of importance, computed as (Calmorin, 1994):

$$Xw = \frac{\sum \mathrm{w}\,(\mathrm{x})}{\sum \mathrm{w}}$$

where:

$\sum$ – means add them up
W – the weights
X – is the value

3. Literature Review

Majority of the native pig raisers were small-scale farmers who raised native pigs as a source of additional income and for household consumption (Villanueva & Sulabo 2018).

Falculan (2021) found that the oldest native pig raiser is 73 years old, female married, and a high school graduate with an estimated monthly income of P3,000-P5,000. The management of native pigs relies on personal experience and involves a combination of fattening and breeding with limited capital. The native pigs were provided with a mixture of local, commercial and leftover feeds in a portable feeder. Most of the piggeries were situated in highland areas, with the pigs tethered and tied under the trees, and the pigpens constructed at ground level. The native pig raisers consistently raise pigs to meet urgent household expenses and never engage in the barter or trade of different commodities when selling pigs owing to their low raising requirements.

On the other hand, Aggalao (2011) found that the mean age for the native pig raisers in Sta. Maria Bulacan was 68 years old, with the youngest respondents at 50 years old and the oldest being 79 years old. Since the majority of native pig farmers in the area are old, they face challenges in expanding

their operations because native pig farming demands intensive labor on the farm. 77% of the producer-respondents, 92% of traders, and 73% of retailers were males who raise native pigs, while 82% of native pig wholesaler-retailers and 75% of processors were females. He similarly found out that among the 76 respondents, only 5% were able to pursue college. 57% reached and/or completed high school, while 33% reached and/or completed elementary education, and 5% never attended school. The study also found that native pig raisers and middlemen have limited experience in native pig enterprise.

Despite these challenges, Philippine native pigs have significant economic utility for smallholder farmers in the region. They are valued locally for their various sociocultural roles (Banayo et al 2023).

4. Results and Discussions

4.1 Profile of the SNP Raisers

Fames The socio-demographic profile of the respondents is reflected in Table 1. It shows that majority of SNP raisers are males (60.87%) and few are females (39.13%). This finding agrees with the results of other studies, which reported that the majority of native pig raisers were males (Artiza et al 2022; Falculan 2021; Yarte et al 2021; Villanueva and Sulabo 2018; Armenia et al 2016). This result could be attributed by the physical demand and laborious nature of raising native pigs, as noted by Artiza et al., (2022) and Falculan (2021). The age distribution was noted mostly towards the middle-aged and elderly, with 34.78% falling within the 50-59 years age group and another 34.78% being 60 years of age or older. This means that a large proportion of the pig raisers were in the older age ranges, with fewer individuals in the younger age groups of 4.35% in the 19-29 and 30-39 age ranges with a weighted mean age of 53.61 years. With this, it is clear that fewer younger community members are involved, which could have implications for the long-term sustainability and generational transfer of this Sinirangan native pig-raising practice. In terms of civil status, the majority of respondents were married (78.26%), followed by widowed (17.39%), and a small proportion of single individuals (4.35%). The educational attainment of the pig raisers was diverse, with 34.78% having completed elementary education, 30.43% secondary education, 13.04% tertiary education, and 21.74% attaining post-graduate qualifications. The primary source of income for the participants was crop production as reported by 73.91% of the respondents, while the remaining 26.09% derived their income from wages. No respondents answered with income from poultry or other livestock enterprises.

Meanwhile, majority of the respondents as shown in Table 2 have been raising SNP for an average of 3.46 years, with the highest proportion (30.43%) having 5 years of experience in raising SNP.

Table 1. Demographic Profile of Sinirangan Native Pig Raisers in Eastern Samar

Attributes	Frequency (N=23)	Percentage (%)
Gender		
Male	14	60.87
Female	9	39.13
Age		
18 and below	-	-
19-29	1	4.35
30-39	1	4.35
40-49	5	21.74
50-59	8	34.78
60 and above	8	34.78
Weighted Mean:	53.61	
Civil Status		
Single	1	4.35
Married	18	78.26
Widowed	4	17.39
Separated	-	-
Educational Attainment		
Elementary	8	34.78
Secondary	7	30.43
Tertiary	3	13.04
Post-graduate	5	21.74
Source of Income		
Crop	17	73.91
Poultry	-	-
Livestock	-	-
Wages	6	26.09

Table 2. Respondents' length of experience in raising Sinirangan Native Pigs

Indicator	Frequency (N=23)	Percentage (%)
Length of experience in raising Sinirangan native pigs		
1 year	3	13.04
1.5 years	1	4.35
2 years	3	13.04
3 years	6	26.09
4 years	1	4.35
5 years	7	30.43
Table 2 continued		
6 years	2	8.70

Weighted Mean: 3.46

4.2 Production and Management Practices

As to the data on production practices in Table 3, the primary source of initial knowledge in raising SNP is through relatives and friends, reported by 56.52% of the respondents, which agrees with the results of various studies (Villanueva and Sulabo 2021; Noronha et al 2017), that the majority of native pig raisers obtained their knowledge and information from parents and friends. The similarity in the key knowledge sources across these studies suggests that social networks and family ties play a crucial role in the dissemination of knowledge and practices related to native pig raising. Further, 21.74% of the respondents' mentioned that they acquired their primary knowledge in raising SNP through trainings/seminars and extension workers/government. However, the majority (82.61%) of the respondents have not attended any seminars on SNP raising. Among the few who have attended, the seminars were primarily sponsored by the Eastern Samar State University (ESSU) (75%) and the Department of Agriculture (25%). The majority of the SNP raisers (78.26%) obtained their pigs from ESSU, while the remaining 21.74% sourced them from neighbors. In terms of the system used for raising SNP, the predominant method is range with shelter (65.22%), followed by complete confinement (21.74%), range without shelter (8.70%), and semi-confinement (4.35%). Regarding animal health management, the majority of the respondents (73.91%) do not vaccinate their pigs. However, 65.22% of the respondents deworm their SNPs, primarily using commercial/synthetic dewormers (93.33%). This finding is concerning, as studies have shown that parasite infection is a common problem in pig production (Addy et al., 2023; Jankowska-Mąkosa et al., 2023). As reported by Li et al (2022), parasite infestations can compromise the health and growth of pigs, threaten the food safety of pork products, and cause significant economic losses for farmers (Abonyi and Njoga 2020). However, deworming without prior diagnosis provides only a short-term effect and excludes the principles of sustainable development in pig production (Jankowska-Mąkosa et al., 2023). The primary health problem encountered is scouring, as reported by all the respondents (100%), which was also noted in native piglets as reported by Mesia et al., (2018). The main challenges faced by the SNP raisers include the high cost of feeds (34.78%), which is consistent with the findings of Artiza (2022) and Okello et al (2021). Furthermore, the high cost of feeds has been reported as a key constraint in the commercialization of native pigs, as reported by Callo-etis (2015). This was followed by low market prices (30.43%), lack of technical knowledge (21.74%), and aggression and behavior of the animals (8.70%). These findings pointing out the need for improving the knowledge and management practices of the SNP raisers, as well as addressing the financial and technical constraints they faced in raising this local swine breed.

Table 3. Respondents' production and mgt. practices in SNP raising

Indicators	Frequency	Percentage
Source of initial knowledge in raising SNP		
Primary source of knowledge		
Relatives/ Friends	13	56.52
Trainings/ Seminars	5	21.74
Extension workers/ Government	5	21.74
Attended seminars on SNP raising		
Yes	4	17.39
No	19	82.61
Sponsor of the seminar		
Private companies	-	-
Table 3 continued		
NGOs	-	-
Department of Agriculture	1	25
ESSU	3	75
Source of Sinirangan native pigs		
Private company	-	-
NGOs	-	-
Department of Agriculture	-	-
ESSU	18	78.26
Others: neighbors	5	21.74
System in raising Sinirangan native pigs		

Complete confinement	5	21.74
Semi-confinement	1	4.34
Range with shelter	15	65.22
Range without shelter	2	8.70
Tethering	-	
Vaccination of pigs		
Yes	6	26.09
No	17	73.91
Deworming of pigs		
Yes	15	65.22
No	8	34.78
Type of dewormer		
Natural	1	4.35
Commercial/ Synthetic	15	65.22
No response	7	30.43
Health problems encountered		
Scouring	23	100
Pneumonia	-	
Parasitic diseases	-	
Problems encountered in raising SNP		
High cost of feeds	8	34.78
Table 3 continued		
Low market price	7	30.43
Not enough capital	1	4.35
Lack of technical knowledge	5	21.74
Aggression and behavior of the animal	2	8.70

4.3 Breeding Practices

The breeding practices of Sinirangan native pig raisers is presented in Table 4. The data shows that majority of the respondents (91.30%) do not keep any breeding records for their pigs. As reported by Noronha et al (2017), native pig raisers do not keep basic records for their animals, indicating a lack of documentation and record-keeping practices in raising these native breeds. Respondents' breeding record-keeping of SNPs is largely based on informal, experience-based knowledge rather than systematic record-keeping. Breeding record is a vital tool for measuring the productive efficiency of a swine herd, as highlighted by Olufemi et al. (2023). This record enables farmers to carry out crucial culling and selection exercises, which are essential for breeding and genetic improvement of the herd. It is used primarily to monitor the performance of individuals for the prediction of genetic breeding values (Bates 2006). In terms of the breeding method used, the most dominant approach is natural breeding with 69.57% of the respondents using this technique. None of the respondents reported using artificial insemination, which is a more technologically advanced and could improve breeding outcomes (Kirola 2023) and has the potential to sustainably improve the profitability as well as the food and nutritional security of resource-poor farmers (Singh et al., 2022). This finding suggests that the SNP raisers rely on traditional, low-input breeding practices. The findings are consistent with Artiza (2022) and Villanueva and Sulabo (2018), who reported that improved practices are still not being adopted. Hence, more scientific studies are needed, especially on native pig breeds. Regarding the breeding methods, 13.04% of respondents use free-range mating, while 56.52% use-controlled mating. However, a significant fraction (30.43%) do not actively engage in breeding as they are more interested in fattening instead. Majority of the respondents (82.61%) said that they do not upgrade their SNPs. This plays a significant role in maintaining the genetic makeup of the native pig population. The key factors considered by the respondents in selecting breeding stock are growth rate and feed efficiency (39.13%), as well as body conformation (30.43%). However, a notable proportion (30.43%) did not provide any response to this question, suggesting a potential lack of awareness or prioritization of selective breeding practices. The selection of appropriate swine breeds is an important aspect that can affect the overall performance and productivity of a swine production system. This has been asserted by Bundy (1975), cited by Falculan (2021). When it comes to the replacement of breeding gilts, 39.13% of the respondents retain gilts from their own litters, while 30.43% purchase replacement gilts. The remaining 30.43% did not provide a response, noting that they do not engaged yet in breeding. Finally, the majority of the respondents (91.30%) sell their culled SNPs at liveweight, rather than slaughtering them on-farm.

Table 4. Respondents' breeding practices of SNP

Indicators	Frequency	Percentage
Keeping breeding records		
Yes	2	8.70
No	21	91.30
Method of breeding used		
Natural breeding	16	69.57
Artificial insemination	-	
No response	7	30.43
Type of breeding		
Controlled mating	13	56.52
Free-range mating	3	13.04
Table 4 continued		
Not practicing	7	30.43
Upgrading of SNP		
Yes	4	17.39
No	19	82.61
Factors considered in selecting SNP for breeding stocks		
Growth rate and feed efficiency	9	39.13
Body conformation	7	30.43
No response	7	30.43
Selection of replacement gilts from own herd		
Retaining gilts from own litters	9	39.13
Purchasing replacement gilts	7	30.43
No response	7	30.43
Culling of SNPs		
Sell at liveweight	21	91.30
Slaughter	2	8.70

4.4 Feeds and Feeding Practices

Respondents reported using various types of feeding practices for their SNPs (Table 5). Majority (73.91%) of the respondents use self-mixed feeds, while 13.04% use commercial feeds. Additionally, 8.70% utilize farm by-products, and 4.35% feed their pigs left-over foods. None of the respondents indicated that their pigs solely rely on scavenging. When it comes to the frequency of feeding, the majority of the respondents (82.61%) feed their pigs twice a day. A smaller proportion (8.70%) feed their pigs once a day or thrice a day, respectively. None of the respondents reported feeding their pigs only when feed is available. These findings suggest that the respondents have a diverse approach to feeding their Sinirangan native pigs, with a preference for self-mixed feeds and a consistent feeding schedule, primarily twice a day. This information can be valuable in understanding the typical feeding practices of Sinirangan native pigs and may inform future recommendations for optimal nutrition and management of these local pig breeds.

Table 5. Respondents' feeds and feeding practices on Sinirangan native pigs

Indicators	Frequency	Percentage
Type of feeds		
Commercial	3	13.04
Self-mixed	17	73.91
Farm by-products	2	8.70
Left-over foods	1	4.35
Scavenging	-	
Frequency of feeding		
Once a day	2	8.70
Twice a day	19	82.61
Thrice a day	2	8.70
Only when feed is available	-	

4.5 Market and Marketing Practices

Table 6 provides results on the market and marketing practices of Sinirangan native pigs (SNPs) among the respondents. The main basis for marketing SNPs is weight (86.96%), rather than age (13.04%). Most respondents sell to middlemen (82.61%), rather than directly at the market (8.70%) or on their own farm (8.70%). The majority of sales are on a per-weight basis (82.61%), with the owner typically setting the price (82.61%) through negotiation (89.96%).

The price per kilogram of live SNP is php 250.00, and the price per head of SNP piglet is most commonly php 2,500 (65.22%). Price per kilogram of SNP carcass is php 300.00. When selecting SNPs for sale or slaughter, the primary factors are age (56.52%) and productivity (21.74%). Buyers predominantly prefer the distinct taste of the meat (78.26%) over body conformation (21.74%) because of the taste and crunchiness of native pig lechon (Callo-etis 2015). The main reason for selling SNPs is as a sideline to a permanent job (56.52%), with some selling to utilize existing land (43.48%). Most buyers purchase SNP piglets as fatteners (78.26%), rather than as breeders (21.74%). The predominant product derived from SNPs is lechon (91.30%). As noted by Callo-etis (2015), the Philippine native pig maintains its niche in the demand for the popular Filipino delicacy called "Lechon". However, no processed meat product was derived from SNPs, with only a small portion (8.70%) of raw meat.

Table 6. Respondents' market and marketing

practices on SNPs

Indicators	Frequency	Percentages
Basis for marketing SNPs		
Age	3	13.04
Weight	20	86.96
Place to sell		
Own farm	2	8.70
Market	2	8.70
Middlemen	19	82.61
Methods of selling		
Per weight basis	19	82.61
Per head basis	4	17.39
Sets the price		
Owner	19	82.61
Middlemen	2	8.70
Buyers	2	8.70
Prevailing market price	-	
Setting of prices		
Negotiation	20	89.96
Prevailing market price	2	8.70
Auction	1	4.35
Price per kilogram of liveweight of SNP		
250php	23	100
Price per head of SNP piglet		
2500php	15	65.22
2000php	5	21.74
No response	3	13.04
Price per kilogram of SNP carcass		
300php	23	100
Methods in selecting SNP for sale/slaughter		
Age	13	56.52
Productivity	8	21.74
Behavior	1	4.35
Phenotypic characteristics	-	-
By chance	1	4.35
Buyer's preference in buying SNP		
Body conformation	5	21.74
Gender	-	-
Distinct taste of the meat	18	78.26
Reason for selling SNP		
As the main source of income	-	-
As a sideline to a permanent job	13	56.52
Utilizing existing land	10	43.48
Purpose of purchasing SNP piglet		
As breeder	5	21.74
As fattener	18	78.26
Common products derived from SNP		
Processed meat	-	-
Lechon	21	91.30
Raw meat	2	8.70

Table 6 continued

5. Conclusion

The profile of SNP raisers indicates a population of mostly males, middle aged and elderly with limited participation from younger individuals. Furthermore, the study revealed sub-optimal production and health management practices, including low vaccination rates and over-reliance on commercial/synthetic dewormers, as well as challenges with high feed costs and limited technical know-how. The breeding and marketing practices of the SNP raisers are predominantly traditional, with a lack of systematic record-keeping, limited use of selective breeding approaches, and reliance on middlemen and the lechon market.

Based on findings, there is a need to have an intervention to address the identified gaps and support the long-term sustainability and development of the Sinirangan native pig industry, focusing on knowledge dissemination, technology adoption, herd management improvements, and market diversification strategies.

6. Conflict of Interest

The authors declare no conflict of interest.

References

[1] Abonyi, F. O., and Njoga, E. O., (2020). Prevalence and determinants of gastrointestinal parasite infection in intensively managed pigs in Nsukka agricultural zone, Southeast, Nigeria. *Journal of Parasitic Diseases*: Official Organ of the Indian Society for Parasitology, 44(1), 31-39.

[2] Addy, F., Adu-Bonsu, G., Akurigo, C. A., Abukari, I., Suleman, H., & Quaye, L. (2023). Prevalence of Gastrointestinal Parasites in Pigs: A Preliminary Study in Tolon and Kumbungu Districts, Ghana. *Journal of parasitology research*, 2023, 1308329.https://doi.org/10.1155/2023/130832

[3] Aggalao BG. 2011. Production of Native Pigs in the Municipality of Tinglayan, Kalinga Province. Swine Mindanao Journal of Science and Technology, 0, 93-106

[4] Artiza, C. S, Menchavez, C. J. A., Suase, K. F. C. L., & Villanueva, J. J. O., (2022). Assessment of Philippine Native Pig (Sus scrofa domesticus) Raisers in selected Municipalities of Agusan del Sur, Philippines. *Annals of Studies in Science and Humanities.*

[5] Armenia, M. R. A. E., Mercado, R. E., & Mercado, J. O. (2016). Production and management practices of backyard swine raisers in the three selected municipalities of Surigao del Sur. *Journal of Scientific Research and Development*. 3 (7): 54-58.

[6] Banayo, J., Manese, K., Salces, A., & Yamagata, T. (2023). Phylogeny and Genetic Diversity of Philippine Native Pigs (Sus scrofa) as Revealed by Mitochondrial DNA Analysis. *Biochemical Genetics*. 61. 10.1007/s10528-022-10318-0

[7] Callo-etis, V. N. (2015). Economic Potential of Raising Philippine Native Pigs on Trichanthera (*Trichanthera Gigantea*) Diets. *IAMURE International Journal of Business and Management*, 10(1). Retrieved from: https://ejournals.ph/article.php? id=3744

[8] Dacules, K. Z and Afable, F. A. (2020). Value Chain Analysis of Sinirangan Pig in Borongan City, Philippines. *International Journal of Social Relevance & Concern* (IJSRC), 2020, 8(9), PP31-35

[9] Falculan, K. N. (2021). Demographic profile, production and marketing management of native pig raisers in the three largest islands in the province of Romblon, Philippines. *Technium Social Sciences Journal.* Vol. 22, 852-869.

[10] Jankowska-Mąkosa, A., Knecht, D., Wyrembak, S., and Zwyrzykowska-Wodzińska, A. (2023). Evaluation of the Level of Parasites Infection in Pigs as an Element of Sustainable Pig Production" Sustainability 15, no. 4: 3671.

[11] Kirola, S. (2023) Artificial Insemination: Advancements in Reproductive Technology. J Fertil In vitro IVF World w *Reprod Med Gent Stem Cell Biol*.11.315.

[12] Li, Y. Z., Hernandez, A. D., Major, S., & Carr, R. (2022). Occurrence of Intestinal Parasites and Its Impact on Growth Performance and Carcass Traits of Pigs Raised Under Near-Organic Conditions. *Frontiers in Veterinary Science*. 9, 911561.

[13] Mesia, J. A. M., Santos, L. A., Labindao, J. P. R., & Bustamante, P. C. (2018). Assessment of native pig production in Western Pangasinan, Philippines. *Journal of Natural and Allied Sciences*, II(1), 16-24.

[14] Nahar, N., Uddin, M., Gurley, E. S., Jahangir Hossain, M., Sultana, R., & Luby, S. P. (2015). Cultural and Economic Motivation of Pig Raising Practices in Bangladesh. *EcoHealth*, 12(4), 611–620.

[15] Noronha AMDG, Agbisit AM, Estrela CAS, Dizon JT. (2017). Productivity of Native Pigs in Subsistence Farming and Their Roles in Community Development in Timor-Leste. Retrieved from: https://www.researchgate.net/publication/321498941_Productivity_of_Native_Pigs_in_Subsistence_Farming_and_Their_Roles_in_Community_Development_in_Timor-Leste

[16] Okello, D. M., Odongo, W., Aliro, T., Ndyomugyenyi, E., & González-Redondo, P. (2021). An assessment of pig feed diversity amongst smallholder pig farmers in Northern Uganda. *Cogent Food & Agriculture*, 7(1).

[17] Salas, J. M. (2024). Sustainability Assessment of the Philippine Native Pig (Sus philippensis) Production in Bataan, Philippines. *International Journal of Agricultural Research and Review*. ISSN: 2360-7971 Open Access. DOI: 10.54978/ijarr.2023. v12: 5, Pp.: 63-69

[18] Singh, M., Talimoa, M. R., Nungshitula, P., Patton, R. N., Rekha, Y., Chaudhary, J. K., Rahul, K., Subhash, B., Rajkhowa, D. J., & Mishra, V. K. (2022). Effect of artificial insemination in comparison to natural mating on the reproductive performance and profitability of smallholder pig production system in Indian Himalaya. *Frontiers in Sustainable Food Systems*, 6.

[19] Villanueva, J., and Sulabo, R. (2018). Production, Feeding and Marketing Practices

of Native Pig Raisers in Selected Regions of the Philippines. *Global Advanced Research Journal of Agricultural Science*. 7. 383-392

[20] Yarte, D. M. T., Neric, C. M. T., Cabangbang, J. A., & Jimenez, C. D. (2021). Marketing of Native Pigs in Sta. Maria, Bulacan 2020. *The FFTC Journal of Agricultural Policy*. Retrieved from: https://ap.fftc.org.tw/article/2848.

[21] Calmorin, L. (1994). Educational research measurement and evaluation 24K Printing Co. Inc., Valenzuela, MM p 26, 27, (1-293).

[22] Olufemi, A. A., Dejumo, A. I., Oluyemi, A. A., Onarinde, E. O., & Adebiyi, G. F. (2023). Understanding Pig Production. Department of Animal Science, University of Ibadan, Nigeria. Printed and published by Emperor Inno Creative 17 Alafia Street, Mokola, Ibadan, Oyo State, Nigeria, +234 (0) 8054059009. ISBN: 978-978-58474-7-5. Retrieved from:https://www.research gate.net/publication/371279853_UNDERSTANDING_PIG_PRODUCTION_BY_ADEBIYI_Et_al_2023

[23] Bates, R. O. (2006). Performance Records and Their Use in Genetic Improvement. Pork information gateway. Factsheets Number: PIG 06-02-03. Retrieved from: https://porkgateway.org/resource/performance-records-and-their-use-in-genetic-improvement/

[24] Cayubit, P. A. (2015). "Visayas now Phil's poorest region. The freeman. http: //www.philstar,com/2015/03/26/ 1437727 / e-visayas- now-phls-poorestregion?nomobile=

[25] DOST-PCAARRD. (2017). R&D Activities to Improve Native Pig Production. https://pcaarrd.dost.gov.ph/index.php/quick-information-dispatch-qid-articles/r-d-activities-to-improve-native-pig-production.