

SOCIOECONOMIC IMPACTS OF SMALL RUMINANT ANIMALS ON WOMEN'S LIVELIHOODS IN HADEJIA, JIGAWA STATE, NIGERIA: CHALLENGES AND OPPORTUNITIES FOR EMPOWERMENT

¹ABDULAZIZ, A.,¹MUHAMMAD, A. S.,¹KAZAURE, L. A.,¹SULAIMAN, A. S.,
¹ABDULLAHI. H. I.,¹SALISU, N.,¹DAHIRU, M.,¹YUNUSA, K., GUMEL, A. M.,
¹MAMUDA, I., And ²ADAMU, N.

¹Department of Animal Health and Production Technology, Binyaminu Usman Polytechnic,
PMB 013, Hadejia, Jigawa State.

²Department of Animal Production Technology, Bauchi State College of Agriculture, P.M.B.008,
Bauchi, Bauch State.

Corresponding Author: aliyuabdulazeez7@bupoly.edu.ng (+2347030963017)

Abstract

This study examines the socioeconomic impacts of small ruminant production on women's livelihoods in Hadejia, Nigeria, focusing on challenges and opportunities for empowerment. Using a cross-sectional survey of 120 women farmers selected through a two-stage sampling technique, the research highlights key findings: small ruminant rearing serves as a critical income source, with production practices dominated by small-scale operations and mixed herds of goats and sheep. Despite its economic significance, the sector faces constraints such as inadequate grazing land, feed shortages, limited veterinary services, and poor market access. The study reveals that women's participation is influenced by their education levels and marital status, with many adopting management practices combining traditional pastoralism with modernized systems, such as semi-intensive housing and purchased feed. Contributions of small ruminants extend beyond income generation to include food security, manure production, and household savings. Farmer-proposed solutions emphasize grazing land improvement, veterinary support, and breed enhancement. The study recommends targeted interventions, including capacity-building programs, gender-sensitive policies, and improved market linkages, to enhance productivity and women's empowerment. These measures, aligned with successful models from similar agro-pastoral systems, could significantly bolster the role of small ruminants in poverty alleviation and sustainable livelihoods in the study area by directly enhancing women's economic independence through increased income control, strengthening decision-making power over livestock management and household resources, and improving access to productive assets

Key Words: *Small ruminant, Women's empowerment, Poverty alleviation and Agro-pastoral livelihoods*

Introduction

Small ruminant production plays a crucial role in enhancing food security, income generation and livelihood sustainability, particularly among rural women in developing economies (FAO, 2022). In Nigeria, where agriculture contributes about 23% of the GDP (World Bank, 2023), smallholder livestock farming especially goats and sheep serves as a vital source of income for marginalized groups, including women who often face limited access to land and financial resources (Olagunju *et al.*, 2023). The economic significance of small ruminants lies in their adaptability to harsh climates, low maintenance costs and high reproductive rates, making them an accessible means of poverty alleviation (Devendra, 2020). In Northern Nigeria, where poverty

levels remain high, with over 50% of the rural population living below the poverty line (NBS, 2022), women's participation in small ruminant rearing provides a pathway to financial independence and household resilience (Umar and Abdulrahman, 2021).

Despite extensive research on small ruminant production in Northern Nigeria, a significant gap exists in understanding its specific role in empowering women in the Hadejia Metropolis of Jigawa State. While broader regional studies highlight general constraints, few investigations focus on the unique agro-pastoral dynamics of Hadejia, a region where the Hadejia-Nguru Wetlands provide critical dry-season grazing but where poverty rates are estimated to be as high as 72.3% among rural households (JSBS, 2023). Furthermore, local livestock statistics indicate that small ruminants constitute over 60% of the livestock owned by women in the area, underscoring their disproportionate importance as a financial asset (HADP, 2023). This confluence of extreme poverty, high female dependence on small ruminants and a unique wetland-based pastoral economy necessitates a targeted analysis. This study therefore aimed to fill this gap by exploring the precise roles of small ruminant animals in poverty alleviation among women in Hadejia, assessing its socioeconomic impact, the distinct challenges faced within this context, and gathering context-specific suggestions for sustainable empowerment.

Materials and Methods

Study Location and Experimental Design

The study was conducted in Hadejia Local Government Area (LGA), located in Jigawa State, Northwestern Nigeria. Hadejia LGA is one of the oldest local government areas in the region, established in 1975 when it was part of Kano State (now Jigawa State). Hadejia LGA is located at approximately latitude 12.4506°N and Longitude 10.0404°E. It shares boundaries with Kiri-Kasamma LGA to the east, Malam-Maduri to the north and Auyo LGA to the west. The area lies within the Sudan Savanna ecological zone, characterized by a semi-arid climate with an average annual rainfall of 600–800 mm and a dry season lasting 6–8 months (JSADP, 2019). The region is predominantly rural, with crop and livestock production serving as the primary agricultural activities.

Sampling Procedure, Sample Size and Data Collection

This study employed a cross-sectional survey design to analyze the socioeconomic characteristics, production practices and poverty-alleviation roles of small ruminant rearing among women farmers in Hadejia LGA. A two-stage sampling technique was used to ensure the selection of a representative and information-rich sample. First, a purposive selection of eight wards (Atafi, Dubantu, Gagulmari, Kasuwar Kofa, Kasuwar Kuda, Majema, Matsaro and Yankoli) was conducted from the ten total wards in the LGA. The selection criterion was based on data from the Jigawa State Agricultural Development Programme (JSADP, 2023), which identified these wards as having at least 30% of households engaged in small ruminant production.

This specific threshold was strategically chosen to ensure the study focused on areas where small ruminant production is a well-established and significant livelihood activity, rather than a peripheral one. This approach enhances the efficiency and focus of the data collection by targeting communities where women's experiences with small ruminants are most pronounced and where the impact on household income and food security can be meaningfully assessed. Consequently, wards with lower engagement rates, where livestock may play a less

critical role, were excluded to provide a clearer understanding of the practice's potential and challenges in its core areas.

In the second stage, a random sample of fifteen women farmers per ward was selected from local farmer registries and with the assistance of community extension agents, yielding a total sample size of 120 respondents. This sample size is consistent with similar socioeconomic studies in Nigerian agro-pastoral systems (Adamu *et al.*, 2023).

Data were collected via a structured questionnaire, which was pretested for reliability (Cronbach's $\alpha > 0.7$). The questionnaire was administered by trained enumerators proficient in the local language and skilled in ethical interview techniques. Face-to-face interviews were conducted over a four-week period in March 2024. This timing was chosen to coincide with the peak dry season, a period of heightened agricultural downtime, to ensure maximum availability and participation of the women farmers.

Data Analysis

Data collected from the 120 respondents were analyzed using a combination of descriptive and inferential statistics to provide a comprehensive understanding of both the characteristics and the underlying relationships within the data. The data were coded and entered into IBM SPSS Statistics (Version 28). Descriptive statistics, including frequencies, percentages and means, and were used to summarize the socioeconomic characteristics of the respondents, their small ruminant production practices, management systems, common challenges, and reported uses of income. To explore the relationships between key variables and identify factors influencing income, inferential statistics were employed, as detailed below.

Determinants of Income from Small Ruminants

To move beyond description and identify the factors that significantly predict financial returns, a multiple linear regression analysis was conducted. The model used annual income from small ruminants as the dependent variable. The independent variables included herd size, education level, production scale, use of purchased feed, and access to extension services.

Interpretation of the Regression Model

The regression model was statistically significant, $F(6, 113) = 8.92$, $p < 0.001$, and explained 38% of the variance in annual income from small ruminants ($R^2 = 0.38$). This indicates that the model is a good fit and the selected variables collectively have a substantial influence on income. The analysis revealed two statistically significant predictors:

- i. **Herd Size ($\beta = 0.512$, $p < 0.001$):** This was the strongest predictor of income. The positive coefficient ($B = 1850$) indicates that for every additional small ruminant in a woman's herd, her annual income increases by approximately 1,850 Naira, holding other factors constant. This finding underscores the direct economic benefit of increasing flock size and aligns with the fundamental principle of economies of scale in livestock production. It suggests that interventions supporting women in building and maintaining larger herds could have a direct and powerful impact on their financial gains.
- ii. **Education Level ($\beta = 0.210$, $p = 0.026$):** The woman's education level was also a significant positive predictor. The results suggest that moving to a higher educational category (e.g., from primary to secondary) is associated with an increase of approximately 4,200 Naira in annual income. This supports the hypothesis that education enhances a woman's capacity to manage her enterprise more effectively, potentially

through better record-keeping, understanding of improved practices, or superior marketing skills.

Other Variables: Variables such as production scale, use of purchased feed, and access to extension services, while showing positive coefficients, were not statistically significant at the 0.05 level in this model. The positive trend for access to extension ($p = 0.057$) is particularly noteworthy and suggests that with a larger sample size or a more precise measure of extension quality, this could emerge as a significant factor.

Results and Discussions

Socio-Economic Characteristics of the Respondents

The socio-economic characteristics of the respondents are presented in Table 1. The age distribution shows strong youth participation, with the largest cohort being 26-35 years old (38.33%). This aligns with emerging reports of youth involvement in Kaduna's peri-urban livestock systems (Oseni *et al.*, 2021) but contrasts sharply with Borno's elder-dominated pastoral communities (Mustapha *et al.*, 2022), suggesting a potentially more dynamic and evolving sector in Hadejia.

The education profile is particularly noteworthy. Half of the respondents (50%) had primary education, and 16.67% had tertiary education. This literacy rate is remarkably high compared to reports from Bauchi's pastoral communities, where fewer than 20% of women had any formal education (Adamu *et al.*, 2023), and exceeds the averages for women in most African smallholder systems (Kebede *et al.*, 2023). This educational advantage is not merely a demographic detail; it has direct implications for productivity and enterprise development. Higher education levels likely enhance women's capacity to access and interpret technical information, adopt improved breeds, feeding practices, and healthcare protocols, as demonstrated in similar agro-pastoral systems (Kebede *et al.*, 2023). For instance, a woman with secondary education may be more likely to understand the benefits of vaccination schedules or supplemental feeding, and a woman with tertiary education might better navigate formal market channels or keep basic financial records. This potential for heightened receptivity to innovation, as suggested by the National Bureau of Statistics (2022), is critically important for designing effective extension programs and technological interventions aimed at this group.

Small Ruminant Animals Production Practices

Table 2 presents the small ruminant animals production practices of the respondents. Production scale in Hadejia shows a predominance of small-scale operations (45%), matching Nigeria's national average (NBS, 2022) but lagging behind Sokoto's more commercialized goat production clusters where 60% operate at medium-scale (Bello *et al.*, 2021). The persistence of small-scale operations is likely driven by structural constraints common to women farmers, including limited access to capital for herd expansion, scarcity of grazing land, and high upfront costs of transitioning to more intensive systems (Olagunju *et al.*, 2023). This places Hadejia in similar standing with Ethiopian smallholder systems (48% small-scale) (Kebede *et al.*, 2023) while trailing India's more commercialized goat belts (35% small-scale) (Kumar *et al.*, 2023). The species mix reveals strategic diversification, with 42.5% of farmers keeping both goats and sheep - a practice that differs from specialized systems in Morocco (Dubeuf *et al.*, 2021) but provides valuable risk mitigation against species-specific diseases or market price fluctuations, similar to Zimbabwe's mixed herds (Nyamushamba *et al.*, 2023).

Table 1: Socio-Economic Characteristics of the Respondents

Parameters	Frequency	Percentage (%)
Age Group		
18-25	31	25.83
26-35	46	38.33
36-45	29	24.17
46-55	8	6.67
56 and above	6	5.00
Marital Status		
Single	47	39.17
Married	58	48.33
Widowed	8	6.67
Divorced	7	5.83
Educational Level		
No formal education	6	5.00
Primary education	60	50.00
Secondary education	34	28.33
Tertiary education	20	16.67
Household Size		
1-5 members	45	37.50
6-10 members	49	40.83
Above 10 members	26	21.67

Breed preferences demonstrate strong adaptation to local conditions. The dominance of Yankasa sheep (42.5%) reflects their stronghold across northern Nigeria (Waziri *et al.*, 2020), though adoption rates remain below Borno's heavy reliance on Sahel goats (60%) (Mustapha *et al.*, 2022). This breed composition shows better climate adaptation than Zimbabwe's commercial flocks but lacks the disease-resistant breeds prevalent in East Africa (Mwacharo *et al.*, 2021). The production purposes highlight Hadejia's economic focus, with income generation (57.5%) being the primary motive, a stronger market orientation than seen in Ekiti State where cultural uses account for 40% of production (Ojo *et al.*, 2023), and closely aligned with report in Ethiopia's small ruminant sector (Kebede *et al.*, 2023).

Management and Feeding Practices of Small Ruminant Animals

The management and feeding practices of small ruminant animals in the study area are shown in Table 3. The feeding systems adopted by women in Hadejia present an interesting intermediate position between various Nigerian and global models. The 37.5% reliance on natural grazing exceeds more intensive systems in Ogun State (20% stall-feeding) (Adebowale *et al.*, 2023) but shows greater diversification than Borno's pastoral systems (80% grazing dependence) (Mustapha *et al.*, 2022). This places Hadejia's small ruminant producers in a transitional phase between traditional pastoralism and modernized production, a phenomenon also observed in Ethiopia's semi-arid regions (Kebede *et al.*, 2023). This transitional phase suggests a significant potential for scaling up through targeted interventions. The existing use of purchased feed (23.33%) provides a foundation for programs promoting cost-effective feed supplementation and conservation, an approach that has successfully boosted productivity in South Africa's smallholder systems (Notenbaert *et al.*, 2023).

Table 2: Small Ruminant Animals Production Practices of the Respondents

Parameters	Frequency	Percentage (%)
Level of Production		
Small Scale	54	45.00
Medium Scale	41	34.17
Large Scale	25	20.83
Species Reared		
Goats	32	26.67
Sheep	37	30.83
Both Goats/Sheep	51	42.50
Major Breeds of Sheep Reared		
Yankasa	51	42.50
Uda	16	13.33
Balami	26	21.67
West African Dwarf	18	15.00
Others	9	7.50
Major Breeds of Goats Reared		
Sokoto Red	46	38.33
Sahelian	42	35.00
West African Dwarf	26	21.67
Others	6	5.00
Number of Ruminants Owned		
1-10	46	38.33
11-20	29	24.17
21-30	24	20.00
31-40	8	6.67
40-50	12	10.00
Above 50	1	0.83
Primary Purpose of Rearing		
Income generation	69	57.50
Food (meat/milk)	24	20.00
Cultural/ceremonial	19	15.83
Savings/investment	7	5.83
Others	1	0.83

Housing patterns demonstrate similar transitional characteristics. The 43.33% prevalence of intensive housing surpasses the finding of Jibril *et al.* (2021) in Kebbi State (25%) but trails Egypt's peri-urban production units (65%) reported by Dou *et al.* (2023). This gradual intensification, driven by growing land pressure and improving market access, mirrors broader trends observed across West Africa's evolving livestock landscapes (Marshall *et al.*, 2020). The move towards confinement presents a critical opportunity to integrate animal manure into crop production, enhancing overall farm sustainability and productivity.

Gender participation in the management of small ruminant animals shows a careful balance. While the 21.67% female-only management outperforms levels in more conservative northern states, the predominant model of joint management (60.83%) maintains cultural acceptability. This collaborative model, resembling the gradual empowerment approaches seen

in Ethiopian women's groups (Galiè *et al.*, 2022), can be a strategic entry point for extension services, ensuring that both men and women are engaged in adopting improved practices, thereby increasing the likelihood of successful and sustainable intensification.

Table 3: Management and Feeding Practices of Small Ruminant Animals

Parameters	Frequency	Percentage (%)
Feeding Practices		
Grazing on natural pastures	45	37.50
Crop residues	17	14.17
Purchased feed	28	23.33
Mixed	25	20.83
Others	5	4.17
Housing System		
Intensive (confined)	52	43.33
Semi-intensive	39	32.50
Extensive	29	23.17
Management Pattern		
Backyard pen	66	55.00
Commercial production	48	40.00
Others	6	5.00
Gender Managing Ruminants		
Male	21	17.50
Female	26	21.67
Both	73	60.83

Small Ruminant Animals Marketing and Income Use

Table 4 depicts the small ruminant animals marketing and income use. Marketing patterns in Hadejia showcased distinct seasonal peaks, with 31.54% of sales occurring annually around religious festivities. This pattern closely agreed with Kano's well-documented Eid-al-Kabir market surges (Waziri *et al.*, 2020). However, this contrasts with Sokoto's more consistent, export-oriented goat trade (Bello *et al.*, 2021). Market channel analysis shows heavy reliance on local markets (40.83%), differing markedly from Ethiopia's export-focused small ruminant sector (Kebede *et al.*, 2023) and suggesting untapped potential for higher-value market access. This reliance on seasonal, local markets often results in lower and unpredictable prices, which directly constrains the capital available for savings and reinvestment.

Income utilization patterns provide critical insights into household economic strategies and vulnerabilities. The allocation of 18.33% of livestock income to education exceeds Jigawa's rural averages (Jigawa Bureau of Statistics, 2023), underscoring the role of women's income in human capital development. Similarly, healthcare spending (13.33%) matches patterns observed among Kenyan pastoralists (Ojango *et al.*, 2021), highlighting how livestock sales function as a vital safety net. However, the relatively low direct investment in savings (20%) is a significant finding. This likely reflects persistent financial access barriers, such as a lack of access to formal banking services or low trust in informal savings groups, a challenge documented in Malawi's smallholder systems (Bett *et al.*, 2021). Furthermore, the high priority given to immediate

household expenses (44.17%) suggests that for many women, subsistence needs absorb surplus income, leaving little for accumulation. This low savings rate has profound implications for financial resilience; it limits the ability of women to invest in productive assets, absorb economic shocks like drought or disease outbreaks, or capitalize on market opportunities outside the peak season, thereby reinforcing a cycle of subsistence-level production and constraining long-term empowerment.

Table 4: Marketing and Income Use

Parameters	Frequency	Percentage (%)
Sell Ruminants Regularly?		
Yes	65	54.17
No	55	45.83
Frequency of Selling (if yes)		
Monthly	27	20.77
Quarterly	20	15.38
Annually	41	31.54
Only during emergencies	28	21.54
No response	4	10.77
Main Market for Selling		
Local market	49	40.83
Middlemen	24	20.00
Direct to consumers	25	20.83
Others	18	15.00
No response	4	3.34
Use of Income		
Household expenses	53	44.17
Children's education	22	18.33
Health care	16	13.33
Savings/investment	24	20.00
Others	5	4.17

Contributions of Small Ruminant Animals to the Women Populace

The multifaceted contributions of small ruminant animals to women in Hadejia are presented in Table 5. The total percentage exceeds 100%, as respondents reported multiple benefits, demonstrating that small ruminants serve several critical, overlapping roles within a single household. This integrated functionality highlights their profound poverty alleviation potential. Food provision was the most cited benefit (63.33% of respondents), slightly exceeding northern Nigerian averages (NBS, 2022) and directly underscoring the sector's role in immediate food security. Concurrently, manure production (48.33%) demonstrates a key secondary contribution, supporting crop-livestock integration and enhancing overall agricultural sustainability (Adebowale *et al.*, 2023).

Beyond direct consumption and soil fertility, small ruminants function as a versatile financial and social asset. Their role as a living savings account (43.33%) and a source of valuable by-products like skins (30.83%) provides critical risk management and diversified income streams, a common strategy in pastoral systems from Sudan to Zimbabwe (Hassen *et al.*, 2022; Nyamushamba *et al.*, 2023). The notable prestige value (23.33%) also indicates their

embeddedness in the socio-cultural fabric, which can enhance a woman's social standing within her community. This synergy of roles where a single animal can simultaneously provide food, fertilizer, financial security, and social capital demonstrates the deep integration of small ruminants into the household economy and their fundamental role in building resilient and multi-dimensional livelihoods for women in Hadejia.

Table 5: Contributions of Small Ruminant Animals to the Respondents

Parameters	Frequency	Percentage (%)
Food	76	63.33
Organic Manure	58	48.33
Skin for Industrial Use (Local and Improved)	37	30.83
Means of Saving	52	43.33
Prestige (Ornament)	28	23.33
Others	21	17.50
	272	226.65

Major Challenges in Small Ruminant Animals Production

Table 6 displays the major challenges jeopardizing small ruminant animals production in the study area. Resource constraints emerge as the dominant challenge, with inadequate grazing land (48.33%) and dry-season feed shortages (40.83%) surpassing concerns in better-watered states like Taraba (Yohanna *et al.*, 2022) but remaining less severe than in Benue's overgrazed systems (Adegbe *et al.*, 2023). The significant concern about low-performing breeds (26.67%) suggests growing recognition of genetic improvement opportunities (Mwacharo *et al.*, 2021).

Marketing system complaints (27.50%) reflect a critical barrier to income growth and stability. The reported challenges, such as reliance on middlemen and limited access to larger markets, often result in low farm-gate prices and high transaction costs. This problem is compounded by the seasonal nature of sales, which forces many women to sell during the same peak periods, creating a local glut and further depressing prices. This inefficient marketing structure directly impacts income stability, preventing women from predicting their revenue stream and constraining their ability to plan for reinvestment or savings. As a result, even when production is successful, the financial returns remain sub-optimal and unpredictable, thereby undermining the potential for sustainable economic empowerment and locking producers in a cycle of subsistence. This frustration with market access is a common theme across West African smallholder systems (Marshall *et al.*, 2020).

Table 6: Major Challenges in Small Ruminant Animals Production

Parameters	Frequency	Percentage (%)
Inadequate Grazing Land	58	48.33
Poor quality and inadequate feed in dry season	49	40.83
Diseases and parasites	24	20.00
Poor Marketing System	33	27.50
Low Performing Breeds	32	26.67
Lack of Technical Skills	31	25.67
Occasional Flooding	26	21.67
Thieves	24	20.00
	277	230.00

Suggestions for Improvement

The respondents' suggestions for improving small ruminant production are exhibited in Table 7. Farmer-proposed solutions emphasize practical and locally-adapted interventions that align with the unique agro-pastoral dynamics of Hadejia. The dominant request for grazing land improvement (48.33%) could be strategically addressed by integrating it with the Jigawa State Government's initiatives around the Hadejia-Nguru Wetlands, promoting community-based rangeland management and the cultivation of drought-tolerant fodder species. Similarly, the high demand for veterinary services (40%) underscores the urgent need to expand the reach of the state's existing veterinary extension network and establish more cost-effective, mobile clinical services tailored to the mobile pastoralist communities in the area.

The strong demand for extension services (30%) exceeds current availability in most northern states (Jigawa Bureau of Statistics, 2023) and indicates a gap in knowledge transfer. This presents a clear opportunity to leverage the National Programme for Food Security (NPFS) platforms in Jigawa to deliver targeted training on feed conservation and herd management. Furthermore, the calls for breed improvement (29.17%) demonstrate a growing awareness of genetic potential (Mwacharo *et al.*, 2021). This aligns with the objectives of the Jigawa Smallholder Dairy Development Programme and could be operationalized through the establishment of community-based breeding schemes, focusing on improving the local Yankasa and Sokoto Red breeds rather than introducing exotic ones. These locally-generated solutions provide valuable, context-specific guidance for development programming, ensuring that interventions are not only evidence-based but also grounded in the expressed needs of Hadejia's women farmers.

Table 7: Suggestions of the Respondents for Improving Small Ruminant Animals Production

Parameters	Frequency	Percentage (%)
Breeds Improvement	35	29.17
Adequate Veterinary Services	48	40.00
Reliable Extension Services	36	30.00
Feed Conservation Improvement	33	27.50
Grazing Lands Improvement	58	48.33
Security	31	25.83
	241	200.83

Inferential Analysis of Factors Influencing Income

While the descriptive statistics outline the practices and challenges, a multiple linear regression was employed to pinpoint the factors that directly influence annual income from small ruminants (Table 8). The model was statistically significant ($F(6, 113) = 8.92, p < 0.001$) and explained 38% of the variance in annual income ($R^2 = 0.38$), indicating a robust model.

The analysis identified herd size and education level as the only statistically significant predictors. Herd size was the strongest predictor ($\beta = 0.512, p < 0.001$), confirming the fundamental economic principle of scale. For every additional animal in a woman's herd, her annual income increased by approximately 1,850 Naira. This finding is consistent with studies in commercialized clusters in Sokoto (Bello *et al.*, 2021) and underscores that asset ownership is a direct pathway to greater financial returns.

Crucially, the woman's education level was also a significant positive predictor ($\beta = 0.210, p = 0.026$). This suggests that moving to a higher educational category is associated with an increase of about 4,200 Naira in annual income. This provides quantitative evidence that education enhances a woman's capacity to manage her enterprise more effectively, potentially through better record-keeping, adoption of improved practices, or superior marketing skills. This finding contrasts with studies in more traditional systems, such as in Bauchi (Adamu *et al.*, 2023), where such a clear educational advantage was not observed. It implies that the relatively high literacy rate among women in Hadejia is translating into tangible economic benefits, positioning them as savvy managers rather than just livestock owners.

The non-significance of other variables like "use of purchased feed" is surprising but suggests that the practice may not yet be cost-effective or that its benefits are indirect. The near-significance of "access to extension" ($p = 0.057$) highlights it as a potential leverage point for future interventions.

This inferential analysis powerfully demonstrates that strategies for enhancing women's income must be dual-pronged: facilitating herd growth through better health and breeding programs, while simultaneously investing in female education and functional literacy.

Table 8: Multiple Linear Regression Model Predicting Annual Income from Small Ruminants (N=120)

Predictor Variable	B (Unstandardized Coefficient)	β (Standardized Coefficient)	t	p-value
(Constant)	-12500		-1.02	0.310
Herd Size	1850	0.512	5.45	<0.001*
Education Level	4200	0.210	2.25	0.026*
Production Scale (Medium)	5800	0.115	1.32	0.189
Production Scale (Large)	10500	0.168	1.78	0.078
Use of Purchased Feed (Yes)	3200	0.095	1.05	0.296
Access to Extension (Yes)	7100	0.175	1.92	0.057

Model Statistics: $R^2 = 0.38$, Adjusted $R^2 = 0.34$, $F(6, 113) = 8.92$, $p < 0.001$

Note: B (Unstandardized Coefficient): Represents the change in annual income (Naira) for a one-unit change in the predictor.

β (Standardized Coefficient): Indicates the relative strength of each predictor, allowing for comparison.

***: ** Denotes statistical significance ($p < 0.05$).

Conclusion and Recommendations

In conclusion, small ruminant production is a critical, multi-dimensional livelihood for women in Hadejia, directly influencing their economic independence. To transform this potential into tangible empowerment evidenced by greater control over income, increased decision-making power in livestock management and sustained asset (herd) growth interventions must be deeply contextual. Specifically, recommendations include: leveraging the Hadejia-Nguru Wetlands for community-based fodder cultivation to combat dry-season shortages, deploying mobile veterinary clinics tailored to the area's agro-pastoral mobility, and establishing women-focused market cooperatives to bypass middlemen and capture higher value, particularly during peak seasons like religious festivities. Furthermore, building on the region's relatively high female literacy, gender-sensitive extension programs should integrate financial literacy and herd record-

keeping to directly strengthen women's managerial agency and ensure the benefits of breed improvement programs for local breeds like Yankasa sheep translate into expanded economic power within their households and communities.

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