Gender Analysis of Cattle Farmers' Participation in Cattle Production in Bauchi and Yobe States, Nigeria

ABSTRACT

Aim: The study analysed the participation of male and female cattle farmers in cattle production in Bauchi and Yobe States Nigeria.

Methodology: A snowball technique was used in selecting one hundred and twenty (120) farmers comprising forty (40) males and twenty (20) females from each of Bauchi and Yobe States respectively. Data on socioeconomic characteristics and participation in cattle production were collected using an interview schedule.

Results: The results reveal that male and female cattle farmers in Bauchi and Yobe States were active producers with mean age in years of 48.9 (males Bauchi), 42.3 (females Bauchi), 44.4 (males Yobe) and 41.4 (females Yobe) respectively. Male farmers had more cattle ($\bar{x}$=38 in Bauchi and $\bar{x}$=20 in Yobe) than their female counterparts ($\bar{x}$=6 in Bauchi and $\bar{x}$= 2 in Yobe). The majority of farmers (male Bauchi = 95%, female Bauchi = 100%, male Yobe = 65%, female Yobe = 80%) had no contact with extension but all farmers (100%) had membership of cooperatives. Male ($\bar{x}$=11.18) and female ($\bar{x}$=11.25) cattle farmers in Yobe State participated in cattle production more than male ($\bar{x}$=9.78) and female ($\bar{x}$=8.00) cattle farmers in Bauchi State. Both male ($\bar{x}$=0.00) and female ($\bar{x}$=0.00) farmers in Bauchi and Yobe States did not participate at all in breeding and artificial insemination. There was a significant difference ($t = 2.223$, $p < 0.05$) in participation of male and female cattle farmers in cattle production in Bauchi State. There was no significant difference ($t = -0.104$, $p > 0.05$) in cattle production between male and female cattle farmers in Yobe State.

Conclusion: There was no participation in highly technical activities like breeding and artificial insemination. It was recommended that cattle farmers should leverage their membership of cooperative societies in accessing adult education, credits and extension services and seek training in breeding and artificial insemination.

Keywords: Cattle farmers, gender, participation, socioeconomic, Bauchi, Yobe.

1. INTRODUCTION

The largest population of cattle is raised in the northern part of Nigeria due to favourable ecological conditions characterized by low rainfall, lighter sandy soil and longer dry season existing in the region [1]. The systems of cattle rearing in Nigeria are classified as pastoral or extensive, agro-pastoral or semi-intensive and commercial or intensive systems of animal husbandry. However, 82% of cattle in Nigeria are kept under pastoral system, 17% under agro-pastoral system while commercial system takes 1% [5]. [5] stated that cattle production in Nigeria is largely in the hands of the pastoral Fulani. These pastoral Fulani manage their cattle under extensive system and often migrate from one location to another in search of green pasture and drinkable water for their herds [9; 4]. While most cattle farmers in many other countries have moved away from extensive pastoral system to intensive system, the Fulani pastoralists have clung to age long culture. Apart from characteristic low productivity, the system is highly laborious requiring the participation of family members and hired labour in cattle production

Comment [D1]: and analyze

Comment [D2]: 1

Comment [D3]: FAO (2019)

Comment [D4]: Fulani [5]

activities. Sosina et al. (2019) stated that rearing cattle under extensive system induced conflicts between crop farmers and pastoralists and caused wanton destruction of lives and properties [22].

Despite the deficiency associated with extensive cattle production, it is still the major supplier of milk and meat in Nigeria. But the demand for milk and dairy products exceeds their supply as the aggregate demand for milk and dairy products is estimated at 1.3 million tonnes per annum out which only 0.5 million tonnes are covered by domestic production. This makes the country to spend about $1.3 billion annually on importation of these products [5]. Nigerian cattle production sub-sector faces a number of challenges that limit it optimum productivity. According to [20], the sub-sector is characterized by limited access to water, limited quality feeds and fodder, limited access to veterinary services and drugs, low yields resulting from unfavourable genetic composition of local breeds, use of archaic production practices, limited access to credit and cost effective financing, lack of farmers' organisation, limited availability of infrastructure, limited production innovation, revenue losses due to traditional dairy products processing, unfavourable competition from milk imports, unaffordability of dairy premium products as well as insufficient consumer sensitization campaigns around the benefits of dairy consumption. It further stated that harnessing the potentials inherent in cattle sub-sector would have multiple transformative benefits on the Nigerian economy in terms of increase in production level, improvement in processing, sustainable livelihoods for cattle farmers, improvement in nutrition statistics, reduction in the country's dairy import bills as well as increase in human physical security with reduction in migration of cattle farmers and attendant herdsmen- farmers conflicts.

Transformation of cattle production structure for the benefits of cattle rearing households, value chain actors, consumers and the nation as a whole, requires gaining insight on gender participation in cattle production. Although, men and women are economic actors who produce food and generate household incomes in most societies around the world, women economic roles may be undermined in patriarchal societies that confer more power of domination on men. [11] asserted that the gender division of roles and responsibilities confers upon women the responsibility for household chores and childcare thereby restricting their participation along the value chain [11]. [18] affirmed that women are usually found in low-status work at the bottom of the value chain where their participation is less visible and this contributes to a widening gap between men and women [18].

Poverty reduction schemes of government and non-governmental organizations require data/insights into economic activities of men and women in cattle production for proper planning in Bauchi and Yobe States. Men and women participation in cattle production may be complementary rather than competitive for economic empowerment of rural households. Therefore, the study provided answers to the following research questions: 1) What are the socioeconomic characteristics of the cattle farmers in Bauchi and Yobe States? 2) What is the level of participation of cattle farmers in cattle production by gender across the two States?
The following hypotheses were tested in this study:

1) There is no significant difference between participation of male and female cattle farmers in cattle production in Bauchi State.
2) There is no significant difference between participation of male and female cattle farmers in cattle production in Yobe State.

Comment [D5]: Add

Comment [D6]: Add

Comment [D7]: out of

Comment [D8]: import

Comment [D9]: its

Comment [D10]: Write Scientists name as corrected earlier

Comment [D11]: Add

Comment [D12]: Write Scientists name as corrected earlier

Comment [D13]: Add

2. MATERIALS AND METHODS

The study was carried out in Bauchi and Yobe States in the northeastern region of Nigeria. The two States have different climatic conditions but they lie adjacent to each other. They are bounded to the west by Borno and Gombe States; to the east by Jigawa and Kano States and part of Kaduna State. They are bounded to the south by plateau State and to the north by Niger Republic. Bauchi State lies within latitudes 9° 3′ N and 12° 3′ N and longitudes 8.5° E and 11° E. It has a land area of 49,119 km^2 and a projected population of 3.8 million inhabitants in 2022 with a 2.8% annual growth rate of the population [15]. The climatic condition of the State is characterized by two distinct dry and wet seasons. The wet season begins from May and ends in September, and the dry season starts in October and lasts up to April with the mean annual rainfall that ranges from 600mm to 1300mm, while the minimum and maximum temperature range from 18.5°C to 32°C. April is the hottest month and January is the coldest month [12].

Yobe State is located in the semi-arid zone of northeastern part of Nigeria. It lies within latitudes 11° 45′ N and 13° 30′ N and longitudes 9° 30′ E and 12° 30′ E, with a total land area of 47,153 square kilometers. The State's projected population was 3, 924, 186 in 2021 using a population growth rate of 3.56% from population of 2, 321, 339 in 2006 [15]. The State has a unique climate from other States in the country. It has hot, cold, dry and rainy seasons in a year. The dry season lasts for more than seven months but the rainy season is short. Rainfall lasts between 120 to 140 days with annual rainfall ranging between 500 mm to 1000 mm from north to south. Between December and February is the period of harmattan which is characterized by cold, dry, dusty and foggy wind. The hottest period in a year is between March and part of June with temperature recording over 40°C [6]. The vegetation of the State is savannah, with notably shorter trees like *Acacia*, Tamarind, Shea butter, locust beans. Most of the inhabitants in Yobe State are rural based and about 80% of the people are engaged in agriculture and 60% engaged in livestock keeping [6]. The State is one of the largest suppliers of livestock in Nigeria [23]. According to [16] and [3], Bauchi and Yobe States had 580, 199 and 1, 081, 204 cattle population in 2020 respectively.

A snowball technique was used to select 40 male and 20 female cattle farmers who were members of Miyetti Allah Cattle Breeders Association of Nigeria from each of Bauchi and Yobe States to give a total of 120 cattle farmers. An interview schedule was used to elicit data from the respondents on their socioeconomic characteristics and participation in cattle production. Participation in cattle production was measured by asking the respondents to indicate the extent of their participation in various cattle production activities on a three-point rating scale of "Always=2", "Occasionally=1" and "Never=0". Participation index was determined by summing the participation scores of all the activities for each respondent. The mean score of participation in each activity was determined and the grand mean of participation index was also calculated. The level of participation in each activity was high if the mean was higher than the grand mean but the level was low if the mean was lower than the grand mean. Data were analysed with both descriptive and inferential statistics. Objectives one and two were analysed with mean while hypotheses one and two were analysed with independent sample t-test using IBM SPSS Statistics version 22.

3. RESULTS AND DISCUSSION

3.1 Socioeconomic Characteristics of Male and Female Cattle Farmers

Table 1 reveals that the mean ages of the male and female cattle farmers in Bauchi State were 48.9 and 42.3 years respectively while that of their counterparts in Yobe State were 44.4 years for males and 41.4 years for females. This implies that most cattle farmers in the study area were within their active and productive ages. Young cattle farmers possess energy needed for rigorous and tedious cattle production activities. This finding agrees with the finding of [24] who reported that the mean age of the cattle farmers in Moyalle District of Oromyia Regional State was 42 years.

The mean years of cattle farming experience of male cattle farmers in Bauchi State was 31.7 while that of their female counterparts was 28.6. In Yobe State, the mean years of experience of male cattle farmers was 19.40 while that of their female counterparts was 13.95. The male and female cattle farmers in Yobe State had much lower years of farming experience compared with their counterparts in Bauchi State. This implies that the majority of the cattle farmers had substantial experience in cattle production in Bauchi and Yobe States. With such experience spanning a long period of time, cattle farmers are well attached to their business and will be able to make better use of new ideas to maximize output if extension services are made available. This finding is in line with the finding of [7] who stated that the more the farmers' experience, the more their abilities to manage general and specific factors which affect the cattle business and other household activities.

Furthermore, Table 1 reveals that the male cattle farmers in Bauchi State had a mean herd size of 38 cattle while the females had 6 cattle whereas in Yobe State, the males had a mean herd size of 20 cattle while their female counterparts had 2 cattle. This shows that the majority of the male cattle farmers had bigger herd size than their female counterparts in either Bauchi or Yobe State. This could be attributed to the fact that men are known as the heads of the families who are always saddled with more responsibilities of taking care of the needs of the household, hence they have high tendency to accumulate more wealth than the women. In addition, Table 1 indicates that the average household sizes of the male and female cattle farmers in Bauchi State were 14 and 6 persons respectively while in Yobe State, the average household size of the male cattle farmers was 14 persons and that of their female counterparts was 17 persons. This shows that the majority of the cattle farmers in both Bauchi and Yobe States had large household size, thus family members can assist them in carrying out various cattle production activities. This finding in contrast with the finding of [14] who reported that the majority (81.0%) of cattle farmers in grazing system had household size of 1-2 persons.

Table 1 further shows that the mean annual income for the male cattle farmers in Bauchi State was ₦441,700.00 while that of their female counterparts was ₦118,850.00 whereas in Yobe State, the mean annual income of male cattle farmers was ₦899,250.00 and that of their female counterparts was ₦365,250.00. This indicates that the male cattle farmers in both Bauchi and Yobe States earned more than their female counterparts and the likely reason is the fact that the male cattle farmers had more number of cattle than their female counterparts. This finding is similar to the findings of [17] who reported that women in Bauchi Local Government of Bauchi State earned low income since only 15.0% of them earned ₦100,000.00 and above.

Table 1 shows that all the cattle farmers in Bauchi State were married (100%) whereas in Yobe State, all the male cattle farmers were married (100%) and the majority (95.0%) of their female counterparts were married. This implies that the majority of the cattle farmers shoulder family responsibilities, which could make them more receptive to new ideas for enhanced cattle production efficiency. This finding is similar to the findings of [7] who reported that the majority (91.0%) of the cattle farmers in Bade Local Government Area were married.

More so, Table 1 shows that all the cattle farmers (100%) in both Bauchi and Yobe States had no access to formal credit. The likely reasons for lack of access to formal credit may include inability to meet the collateral requirements, poor formal education, and lack of contact with extension agents who could inform and educate them about available credit and how to access it. The implication is that the rate of technology uptake among the cattle farmers will be impeded since technologies require capital investments for their adoption. This finding is consistent with the finding of [8] who stated that almost (95.50%) of traditional beef cattle farmers in Meatu District of Simiyu Region in Tanzania did not have access to credit
.
In addition, Table 1 reveals that 95.0% and 100% of the male and female cattle farmers in Bauchi State respectively and 65% and 80% of the male and female cattle farmers in Yobe State respectively had no contact with extension agents. The inability of the majority of the cattle farmers to have contact with extension agents could be attributed to inadequate extension service in the study area. The implication of not having contact with extension agents is that the majority of the cattle farmers in Bauchi and Yobe States will not be exposed to improved technologies that could enhance cattle productivity. This finding is in contrast with the finding of [1] who reported that 70.0% of the urban livestock farmers in Southeastern Nigeria had extension contact.

Furthermore, Table 1 indicates that all the cattle farmers (100%) in both Bauchi and Yobe States were members of cooperative society. Agricultural cooperatives are expected to assist their members with services of common interest like pooling savings and accessing loans with low interest, accessing extension services and marketing of cattle. Since all the cattle farmers were members of cooperative society, they could take advantage of this to liaise with agricultural extension officers to obtain access to extension contact as well as formal credit facilities since most financial lending institutions prefer lending to a group of individuals to a single person. This finding disagrees with the finding of [7] who reported that the majority (73.0%) of cattle farmers in Bade Local Government Area were not members of association.

Table 1 indicates that the majority (92.50%) of the male cattle farmers and all the female cattle farmers (100%) in Bauchi State had no formal education while in Yobe State, the majority (75.0%) of the male cattle farmers and the majority (70.0%) of the female cattle farmers also had no formal education. Lack of formal education among the cattle farmers in Bauchi and Yobe States could be attributed to poor attention given to western education and inadequate or lack of formal educational facilities in the areas where the majority of the cattle farmers were resident. The implication of this is that lack of education slows down the ability of cattle farmers to acquire new knowledge and skills and to adopt innovations through extension agency for enhanced cattle productivity. Lack of formal education could also greatly limit the ability of the majority of the cattle farmers to actively participate in some cattle production activities that

require high skills or technical know-how such as breeding and artificial insemination. This finding is similar to the finding of [10] who reported that only 10.50% and 4.90% of pastoralists in Yewa Division of Ogun State had secondary and primary education respectively.

Also, Table 1 reveals the results on other income sources of cattle farmers. The majority (87.5%) of the male cattle farmers and the majority (90.0%) of the female cattle farmers in Bauchi State were involved in arable farming while in Yobe State, the majority (87.5%) of the male and the majority (70.0%) of the female cattle farmers were also involved in arable farming. This implies that the majority of cattle farmers in the study area were also involved in the cultivation of crops and this helps to boost food crop production and income of cattle farmers. This finding does not agree with the findings of [19] who reported that only 2.0% of livestock farmers in Ibrahimpur village of North Goa District were involved in crop farming.

More so, Table 1 indicates that only 47.5% and 45.0% of the male cattle farmers in Bauchi State obtained their initial capital through personal savings and proceeds of inheritance respectively while more than half (55.0%) and only 30% of the female cattle farmers in Bauchi State obtained their initial capital via proceeds of inheritance and credit from family and friends respectively. In Yobe State, all the female cattle farmers (100%) obtained their initial capital through personal savings while the majority (90.0%) of their male counterparts obtained their initial capital through personal savings. This finding is similar to the findings of [13] who reported that the majority (77.40%) and half (50%) of male and female dairy keepers respectively in Tanga City and 75.80% and 76.90% of their male and female counterparts respectively in Iringa Municipality started dairy keeping by their own efforts with accumulated money from different sources.

Table 1: Socioeconomic Characteristics of Male and Female Cattle Farmers (n=120)

Variable		Bauchi State Cattle Farmers		Yobe State Cattle Farmers	
		Male (n=40)	Female (n=20)	Male (n=40)	Female (n=20)
Age (years)	**mean**	48.9	42.3	44.4	41.4
Experience (years)	**mean**	31.7	28.6	19.40	13.95
Herd size	**mean**	38.00	6.00	20.00	2.00
Household size	**mean**	14.00	6.00	14.00	17.00

Annual income (₦) mean	441,700	118,850	899,250	365,250
Marital Status	**Percentage**	**Percentage**	**Percentage**	**Percentage**
Single	0.0	0.0	0.0	0.0
Married	100.0	100	95.0	95.0
Widowed	0.0	0.00	0.00	5.00
Access to formal credit	**Percentage**	**Percentage**	**Percentage**	**Percentage**
No	100.0	100.0	100.0	100.0
Contact with extension agents	**Percentage**	**Percentage**	**Percentage**	**Percentage**
Yes	5.0	0.0	35.0	20.0
No	95.0	100.0	65.0	80.0
Cooperative membership	**Percentage**	**Percentage**	**Percentage**	**Percentage**
Yes	100.0	100.0	100.0	100.0
Level of education	**Percentage**	**Percentage**	**Percentage**	**Percentage**
No formal education	92.5	100.0	75.0	70.0
Primary education	5.0	0.0	10.0	5.0
Secondary education	0.0	0.0	10.0	20.0
Tertiary education	2.5	0.0	5.0	5.0
Other occupation	**Percentage**	**Percentage**	**Percentage**	**Percentage**
Trade	0.0	0.00	0.0	20.0
Arable farming	87.5	90.0	87.5	70.0
Civil service	0.0	0.0	2.5	0.0
None	12.5	10.0	10.0	10.0
Source of initial capital	**Percentage**	**Percentage**	**Percentage**	**Percentage**
Personal savings	47.5	15.0	90.0	100.0
Credit from family and friends	7.50	30.0	2.5	0.0
Proceeds of inheritance	45.0	55.0	7.50	0.0

Source: Field survey, 2021

Comment [D14]: Not clear??

3.2 Gender Participation in Cattle Production

Table 2 shows the grand means of participation indices of cattle production activities among the male and female cattle farmers in Bauchi State as 0.82 and 0.67 respectively while their male and female counterparts in Yobe State had grand means participation of 0.93 and 0.94 respectively. This implies that the male cattle farmers in Bauchi State had higher level of participation in cattle production as compared with their female counterparts. Also, the female cattle farmers in Yobe State participated more in cattle production than their female counterparts in Bauchi State. Specifically, Table 2 reveals that the male cattle farmers in Bauchi State had high level of participation in activities like milking (mean = 1.73),watering (mean = 1.33), herding (mean = 1.23), feeding (mean = 1.20), treating sick cattle (mean = 1.10), caring for calves (mean = 1.03) and tethering (mean = 1.03) whereas their male counterparts in Yobe State had high level of participation in activities such as feeding (mean = 1.98), watering (mean = 1.95), caring for calves (mean = 1.60), herding (mean = 1.56), collection of dungs (mean = 1.15) and tethering (mean = 1.00) since the mean scores of these cattle production activities were greater than the grand means for Bauchi and Yobe States. This indicates their level of dominance in the performance of these activities in cattle production. This finding is in contrast with the findings of [21] who reported that men had low participation in feeding (45.0%) and watering (28.33%). More so, Table 2 shows that the male cattle farmers in Bauchi State had low level of

participation in cattle production activities like collection of dungs (mean = 0.70), shade provision (mean = 0.40) and record keeping (mean = 0.05) with no participation in breeding (mean = 0.00) and artificial insemination (mean = 0.00) while their male counterparts in Yobe State also had low level of participation in cattle production activities such as milking (mean = 0.88), treating sick cattle (mean = 0.88), record keeping (mean = 0.18) with no participation in shade provision (mean = 0.00), breeding (mean = 0.00) and artificial insemination (mean = 0.00). This finding agrees with the findings of [21] who reported that men had poor participation in record maintenance which accounted for only 38.0%.

In relation to the female cattle farmers, Table 2 reveals that those in Bauchi State had high level of participation in activities like watering (mean = 2.00), feeding (mean = 2.00) and caring for calves (mean = 2.00) while their female counterparts in Yobe State had high level of participation in activities such as watering (mean = 1.65), collection of dungs (mean = 1.60), feeding (mean = 1.50), caring for calves (mean = 1.05) and treating sick cattle (mean = 1.00) since the mean scores of these cattle production activities were above the grand means for each of Bauchi and Yobe States. This finding is consistent with the findings of [21] who averred that women had high level of participation in feeding animals (90.0%) and watering animals (88.33%). This finding is also in line with some findings of [2] who reported that women had greater participation in certain livestock activities such as watering (100%) and animal health treatment (97.60%) compared with their male counterparts. Furthermore, Table 2 shows that none of the female cattle farmers in Bauchi State participated in cattle production activities like milking (mean = 0.00), herding (mean = 0.00), treating sick cattle (mean = 0.00), tethering (mean = 0.00), collection of dungs (mean = 0.00), shade provision (mean = 0.00), record keeping (mean = 0.00), breeding (mean = 0.00) and artificial insemination (mean = 0.00) as the mean score of participation in these activities was zero whereas the female cattle farmers in Yobe State had low participation in activities such as milking (mean = 0.50), herding (mean = 0.45) and tethering (mean = 0.40) with no participation in record keeping (mean = 0.00), shade provision (mean = 0.00), breeding (mean = 0.00) and artificial insemination (mean = 0.00) as the mean scores of these activities were below the grand means for both Bauchi and Yobe States. The non-participation of both males and females in shade provision could be attributed to the extensive system of raising cattle being practised by the cattle farmers in the study area. The implication is that cattle were reared under the scorching heat of the sun and heavy rainfall depending on the season, which could negatively affect their productivity. Lack of participation in breeding and artificial insemination could be attributed to lack of access to extension trainings and inadequate formal education as revealed in Table 1. The implication of this is that the cattle farmers will solely depend on the natural way of multiplying their cattle which is characterized by low productivity compared with the application of artificial insemination and breeding techniques in cattle production. This finding is consistent with the findings of [21] who reported that women had poor participation in record maintenance as their participation only accounted for 28.33%. This finding is also in line with some findings of [2] who reported that women had lesser participation in such activities as milking (21.0%) and barn preparation (40.70%) compared with their male counterparts.

Table 2: **Gender Participation of Cattle Farmers in Cattle Production (n=120)**

Activities	**Bauchi State**	**Yobe State**

	Cattle farmers		Cattle farmers	
	Male	**Female**	**Male**	**Female**
	Mean	**Mean**	**Mean**	**Mean**
Milking	1.73 (HLP)	0.00 (NP)	0.88 (LLP)	0.50 (LLP)
Watering	1.33 (HLP)	2.00 (HLP)	1.95 (HLP)	1.65 (HLP)
Herding	1.23 (HLP)	0.00 (NP)	1.58 (HLP)	0.45 (LLP)
Feeding	1.20 (HLP)	2.00 (HLP)	1.98 (HLP)	1.50 (HLP)
Treating sick cattle	1.10 (HLP)	0.00 (HLP)	0.88 (LLP)	1.00 (HLP)
Caring for calves	1.03 (HLP)	2.00 (HLP)	1.60 (HLP)	1.05 (HLP)
Tethering	1.03 (HLP)	0.00 (NP)	1.00 (HLP)	0.40 (LLP)
Collection of dungs	0.70 (LLP)	0.00 (NP)	1.15 (HLP)	1.60 (HLP)
Shade provision	0.40 (LLP)	0.00 (NP)	0.00 (NP)	0.00 (NP)
Record keeping	0.05 (LLP)	0.00 (NP)	0.18 (LLP)	0.00 (NP)
Breeding	0.00 (NP)	0.00 (NP)	0.00 (NP)	0.00 (NP)
Artificial insemination	0.00 (NP)	0.00 (NP)	0.00 (NP)	0.00 (NP)
Grand mean	**0.82**	**0.67**	**0.93**	**0.94**

Source: Field survey, 2021 Mean ≥ 0.82, 0.67, 0.93 or 0.94 indicates high level of participation (HLP); mean <0.82, 0.67, 0.93 or 0.94 indicates low level of participation (LLP); mean = 0.00 indicates no participation (NP)

Comment [D15]: Delete

3.3 Hypotheses Testing

The test of difference between male and female cattle farmers in Bauchi State reveals that male cattle farmers participated more (mean = 9.78) than female cattle farmers (mean = 8.00) and there was a significant difference ($t = 2.223$, $p < 0.05$) in participation in cattle production (Table 3) while similar test shows that there was no significant difference ($t = -0.104$, $p > 0.05$) in cattle production between male (mean = 11.18) and female (mean = 11.25) cattle farmers in Yobe State (Table 4).

Table 3: T-test of difference in participation in cattle production between male and female farmers in Bauchi State

Participation in cattle production	**Mean**	**Mean difference**	**T-value**	**Significance level 2-tailed**	**Decision**
Male cattle farmers in Bauchi State	9.78	1.78	2.223	0.03*	Reject H_o
Female cattle farmers in Bauchi State	8.00				

Source: Field survey, 2021

Comment [D16]: Delete

* = significant at 5% level of probability

NS = Not significant

Table 4: T-test of difference in participation in cattle production between male and female farmers in Yobe State

Participation in cattle production	Mean	Mean difference	T-value	Significance level 2-tailed	Decision
Male cattle farmers in Yobe State	11.18	-0.075	-0.104	0.92 NS	Accept H_o
Female cattle farmers in Yobe State	11.25				

Source: Field survey, 2021

* = significant at 5% level of probability

NS = Not significant

Comment [D17]: Delete

4. CONCLUSION AND RECOMMENDATIONS

Male and female cattle farmers in Bauchi and Yobe States in northeastern Nigeria were young active producers. Male farmers had more cattle than their female counterparts in both States hence; male farmers had more incomes than their female counterparts. The majority of male and female cattle farmers did not have formal education but membership of cooperatives was high. Both male and females farmers had no access to formal credits and they were largely deprived of extension services. However, male and female farmers participated at varied extent in watering, feeding, herding, treating of sick animals, collection of dungs and caring for calves. Participation of male cattle farmers in record keeping was very low while female cattle farmers recorded non-participation. Both male and female farmers did not participate at all in breeding, which was still natural and indiscriminate, and in artificial insemination. Male and female cattle farmers in Yobe State participated in cattle production more than male and female cattle farmers in Bauchi State. Low or no participation in low skill activities implies engagement of family members or hired labour while no participation in technical activities like breeding and artificial insemination implies a lack of know-how, which may require the use of professional services. Based on the conclusion, it was recommended that cattle farmers should leverage their membership of cooperative societies in accessing adult education, credits and extension services and seek training in breeding and artificial insemination.

Comment [D18]: Delete

REFERENCES

1. Asadu, A. N., Chah, J. M., Attamah, C. O. and Igbokwe, E. M. (2021). Knowledge of Hazards Associated with Urban Livestock Farming in Southeast, Nigeria. *Front. Vet. Sci. 8: 600299. Doi: 10.3389/vets.2021.600299, 1-10*.
2. Dan, Y. and Kim, I. (2020). Women Participation in Livestock Raising and Household Management in Rural Communities of Nafada, Semi-Arid Region of Northeastern Nigeria. *Advances in Social Sciences Research Journal*, **7** (1): 166-177.
3. Federal Ministry of Agriculture and Rural Development [FMARD] (2020). The Agriculture Promotion Policy (2016-2020): Building on the Success of the ATA, Closing Key Gaps: Policy and Strategy Document. FMARD, Abuja, Nigeria.

4. Food and Agriculture Organization [FAO] (2015). Milk and Dairy Products Postharvest Issues and Food Safety in Sub-Saharan Africa and the Near East. FAO Report, Rome, Italy.
5. Food and Agriculture Organization [FAO] (2019). African Sustainable Livestock 2050: The Future of Livestock in Nigeria: Opportunities and Challenges in the Face of Uncertainty. FAO, Rome, Italy.
6. Ibrahim M. W. and Hosea, D. (2018). Determinants of Profitability of Goat Marketing in Yobe State, Nigeria. *SSRG International Journal of Agriculture and Environmental Science (SSRG-IJAES)*, 5 (3): 26-29.
7. Ishaya, D. B., Makinde, O. J., Oyediran, B. O. and Yahaya, H. T. (2018). Socioeconomic Determinants of Cattle Production among Farmers in Bade Local Government Area, Yobe State, Nigeria. *International Journal of Research in Agriculture and Forestry*, 5 (1): 1-7.
8. Kibona, C. A. and Yuejie, Z. (2021). Factors that Influence Market Participation among Traditional Beef Cattle Farmers in the Meatu District of Simiyu Region, Tanzania. *PLOS ONE*, 16 (4): 1-14.
9. Lawal-Adebowale, O. A. (2012). Factors Influenecing Small Ruminant Production in Selected Urban Communities of Abeokuta, Ogun State, Nigeria. *Journal of Animal Production*, 39 (1): 218-228.
10. Lawal-Adebowale, O. A., Ayinde, I. A., Olanite, J. A., Ojo, V. O. A., Onifade, O. S., Jolaoso, A. O. and Arigbede, O. M. (2018). Pastoralists' Grazing Systems and Eco-related Outcomes in Yewa Division of Ogun State, Nigeria. *Tropical Grasslands Frontiers. Socio-farmer 14*.
11. Me-Nsope, N. and Michelle, L. (2015). Gender Analysis of the Pigeon Pea Value Chain: Case Study of Malawi. Center Report Series, No.4. Global Center for Food Systems Innovation, Michigan State University, East Lansing, Michigan, USA.
12. Mohammed, S. Y., Murtala, N., Jibril, S. A. and Mohammed, S. (2020). Costs and Returns of Sweet Melon Marketing in Bauchi and Gombe States, Nigeria. *Journal of Agripreneurhip and Sustainable Development* (JASD). 3 (3). 2651-6365
13. Mvurungu, E. J. (2013). Gender Analysis on Milk Value Chain: A Case of Tanga City and Iringa Municipality. A Dissertation Submitted in Partial Fulfillment of the Requirement for the Degree of Master of Arts in Rural Development of the Sokoine University of Agriculture, Morogoro, Tanzania.
14. Nalle, A. A., Hartono, B., Nugroho, B. A. and Utami, H. D. (2017). Domestic Resources Cost Analysis of Small-scale Beef Cattle Farming at Upstream Area of Benain Woelmina Watershed, West Timor East Nusa Tenggara. Published by De Gruyter Open, 417-424.
15. National Population Commission (NPC) (2006). Annual Statistical Abstract on Nigeria Population Census. National Population Commission, Abuja, Nigeria.
16. National Agricultural Extension and Research Liaison Services (NAERLS) and Federal Ministry of Agriculture and Rural Development (FMARD) (2020). Wet Season Agricultural Performance in Nigeria. NAERLS Press, Zaria, Nigeria.
17. Nuhu, H. S., Donye, A. O. and Bawa, D. B. (2014). Barriers to Women Participation in Agricultural Development in Bauchi Local Governement Area of Bauchi State, Nigeria. *Agriculture and Biology Journal of North America*, 5 (4): 166-174.

18. Olanike, K. O. (2021). Analysis of Gender Participation in the Marketing and Processing of the Cassava Value Chain in Nigeria. M. Sc. Thesis, Submitted to the Graduate Faculty of Auburn University.
19. Reddy, V. K., Mahajan, G. R., Paramesh, V. and Singh, N. P. (2017). Socio-Economic Status of Livestock Farmers of Ibrahimpur Village, North Goa District: A Benchmark Analysis. *Economic Affairs*, 62 (2): 335-340.
20. SAHEL (2019). The Nigerian Dairy Sector. Vol. 20. SAHEL Consulting Agriculture & Nutrition Ltd. Available at: www.sahelcp.com.
21. Shreyansh, S. H., Pavithra, G. N., Pradeepkumar, S., Jagadeeswary, V. and Satyanarayan, K. (2018). Gender Analysis in Livestock Production. An Exploratory Study in Karnata. *International of Pure Applied Bioscience*, 6(2). Pp. 627-632.
22. Sosina, A. O., Babayemi, O. J. and Adeoso, O. A. (2019). Assessment of Cattle Production Practices among Crop-Livestock Farmers in South West, Nigeria. *International Journal of Animal Science*, 3 (3): 1050.
23. Yobe State Ministry of Agriculture (2011). Survey of the State Agricultural Resources. Yobe State Ministry of Agriculture, Damaturu, Nigeria.
24. Zekarias, B. F. (2017). Market Chain Analysis of Live Cattle in Borana Pastoral Area: The Case of Moyalle District, Oromyia Regional State Southern Ethiopia. Wondogenet College of Forestry and Natural Resource, Hawassa University, Ethiopia. Juniper Publishers.