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HERD AND MILK PRODUCTION CHARACTERISTICS OF SMALLHOLDER DAIRY FARMERS IN TWO LOCAL GOVERNMENT AREAS OF KADUNA STATE

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ABSTRACT

A study was carried out to assess the herd and milk production characteristics of smallholder dairy farmers in two different local government areas of Kaduna State. Four villages were purposively chosen based on their similar demographic characteristics such as farm sizes, sources of livelihood and types of crops cultivated. Data used were obtained from 100 smallholder dairy households, which were randomly selected using a multi-stage sampling approach and the villages selected were mainly into milk production and processing. The required data and information were collected directly from the field. Information used in this article is generally qualitative in nature based on field observation, farm survey and informal discussion with farmers. The data collected were analysed using descriptive statistics in SPSS package to determine the frequencies and the percent of the data generated from the field. The result of the categories of animals kept by farmers' shows that majority of the farmers' keep only cattle while some others keep more than one species. White Fulani is the most dominant breed reared by the farmers. Some farmers keep only White Fulani cattle (59 farmers in total), others keep two breeds–Sokoto Gudali and White Fulani (17 farmers) while 24 farmers keep more than two distinctive species. Majority of the farmers in all the study areas were found to harvest the milk for both selling and house consumption. It can be concluded that most of the farmers keep animals (especially cattle) for multiple purposes; they harvest milk for house consumption and sell some portion to overcome other household expensive. Therefore, state governments, federal government and other donors need to allocate more resources toward smallholder dairy enhancement particularly in the areas of feed management, water provision and animal's health managements. They should also consider constructing more milk collection centers near the smallholder dairy farmers in order to reduce the distance travelled to deliver milk to the market.

Keywords: Herd, Milk production, Characteristics, Smallholder, Dairy.

INTRODUCTION

Livestock production is very importance in the country due to highly demand of animal protein that is increasing over time. The rapid growing of human population and the increasing purchasing power of Nigerian citizens are the main drivers of the increasing animal protein. Income is one of the several reasons farmer keep livestock besides other reasons such as capital savings for unexpected expenditure, manure for crops, milk production, social status, hobby, utilization of crop by-products and draught animal (Nugroho, 2002).

Intensification of dairy farming system is predominantly practiced in the developed countries such as Netherlands. Dairy farmers keep exotic breeds of cattle mainly for milk production such as Hosltein Friesian, Ayrshire etc. They also used milking machines instead of hand milking system that is mostly practiced in the developing countries. The average of milk yield of Holstein and Friesian cow in developing

counties is approximately 25 litres per day per cow (Mallau-Aduli *et al*., 2009).

The Nigerian dairy industry is dominated by smallholder dairy farmers mainly, the Fulani pastoralist who depends on seasonal supply of forages and water. They dispose their milk as fresh products with little or no value addition. The industry produces an estimate of 450, 000 tons of milk per annum (FAO, 2010). The average milk yield obtained is 1.27-3 litres per cow per day during the wet season and less than 0.36-1 during dry season (Yuan *et al*., 2010). Most poor African farmers including Nigeria depend on livestock that they normally keep as insurance when crops fail, some scholars like Pica-Ciamarra and others summarized the direct and indirect contribution of livestock to poor rural household livelihoods which include; provision of cash income through the sale of animals to deal with significant or unexpected expenditures, the sale and consumption of milk, meat, eggs and other animal products, serve as form of savings and insurance, provides manure for plant growth, use as animal power for draft and transport services (Taruvinga *et al*., 2013; Weiler *et al*., 2014).

Nigeria is experiencing a historic demographic expansion and a spectacular change in food habits. With a population growth nearing 2.8% per year, the country's own domestic production is far from being able to meet the demand.

Therefore, to develop an innovative system that is socially acceptable, economically viable and environmentally sound, we must have a clear understanding of our current production system amidst climate change and insecurity in order to plan for successful interventions. The broad objective of the study was to assess herd and milk production characteristics of smallholder dairy farmers in two local government areas of Kaduna state.

MATERIALS AND METHODS

Description of Study Area

The study encompasses two main local government areas in Kaduna State Sabon-Gari and Giwa. Sabon-Gari LGA is located within a 07^{o} 02''E and latitudes11^{o} 30'N. The area falls within the northern Kaduna sub-region. The area has a characteristic tropical continental climate, marked by distinct wet and dry seasons. Generally, Kaduna northern area has a relatively low precipitation with average annual rainfall of about 127mm. the peak period of rainfall is August-September. The vegetation type is Savanna vegetation where trees, shrubs and grasses are scattered over space.

Giwa local government is among the populated place in North western part of Kaduna State. The land mass has been estimated to be 2,066 km² with 11 ward and 2 development area Administrative/ Council. It is located at an elevation of 614 meters above sea level and its population amounts to 139,494 and increase to 286,427 at the 2006 census. Its coordinates are 11°07'0" N and 7°44 '0" E in DMS (Degrees Minutes Seconds) or 11.3 and 7.45 (in decimal degrees). Its UTM position is LT34 and its Joint Operation Graphics reference is NC32-01. The vegetation of the area is the Northern Guinea Savanna of the ecological zone type with two distinct seasons, a wet season in summer and a dry season in winter. Rainfall occurs between the months of April to October with a peak in August. The mean annual rainfall is about 1800 mm and the mean monthly temperature is 25ºC, while the relative humidity is about 63%.

Sampling Method

A multistage sampling approach was employed in this study, where two main different villages that are solely into milk production and processing. These villages were purposively chosen based on their similar demographic characteristics such as farm sizes, sources of livelihood and types of crops cultivated. According to Barbie and Mouton (2008) purposive sampling is a valuable kind of sampling used in

exploratory research that gives the best chance to get rich qualitative data.

The random sampling method was employed for collecting data from households. The simple random sampling method was used due to the homogeneity of farmers. Broadly, all the smallholder farmers face the same weather, have common livelihood assets, market and soil conditions. They also have similar socioeconomic characteristics. Hence this sampling approach provided the farmers equal chances of being part of the study (Vondi *et al.*, 2015).

Sources and Method of Data Collection

This experiment was conducted during dry season between the months of March/May. The required data and information were collected directly from the field. Questionnaire was administered to the selected villages of two different local government areas. Idasu, Kaya and Sabon fegi are located in Giwa Local Government whereas Rugarfulani and its bordering areas are from Sabon Gari local government. Information used in this article is generally qualitative in nature based on field observation, farm survey and informal discussion with key informants conducted in March 2018.

The study was conducted at the face-to-face level and obtained a response rate of approximately 97%. Out of the questionnaire administered to each of the settlements, the entire questionnaire were analyzed and answered. In addition to the primary data, the study collected secondary data including a review of available literature and statistics on the topic areas, including reports and working documents prepared by many researchers as well as other official publications. The secondary data analysis also involved archival research from books, journals, magazines, articles, internet materials and other related information.

Data Analysis

Primary data were collected and analysis with the aid of Statistical Package for Social Sciences (SPSS) Descriptive statistics in the SPSS package was used to determine the frequencies of the data generated from the field.

RESULTS AND DISCUSSION

Table 1 shows herd characteristics of dairy farmers in Sabon Gari and Giwa local government areas of Kaduna State. The result of the categories of animals kept by farmers' shows that majority of the farmers' keep only cattle while some others keep more than one species. The Sabon Fegi village has the highest frequency (22) farmers while Kaya village with the least. Likewise, there were some farmers who rear cattle, sheep and goat - 5.6% of farmers from Idasu village and only 6.3% from Rafinsidi village.

White Fulani is the most dominant breed reared by the farmers. Some farmers kept only White Fulani cattle (59 farmers in total), others rear a mixture of only two breeds– Sokoto Gudali and White Fulani (17 farmers) while some keep more than two distinctive species (24 farmers). Kaje village has the highest population of farmers (8 farmers) keeping more than two distinctive breeds followed by Sabon Fegi (7 farmers); the Rugarfulani (1 farmer) and Kaya (1 farmer) was the least.

The average herd size (cattle) for farmers across the studied local government areas revealed that majority of the farmers (25%) keep 30-39 cattle while 4% keep 90-100 heads of cattle and 2% keep1-9 cattle.

The results of production purposes revealed that, all the smallholder dairy farmers at the six locations reared cattle for multiple purposes, chiefly for asset, milk, social and meat production and traction as shown in Table 1.

The result of the mating system was found to be 100 percent natural (random mating) where one or two bulls were kept in the herd for servicing the entire herd. Bull of old age that grown bigger are not allow to stay in the herd thus attracting cattle rustler in to the herd. Replacement bulls with younger age

are used after which the old ones have been disposed.

White Fulani (Bunaji) was found to be the most dominant breeds over other breeds. Therefore, the dominance of Bunaji over other breeds is due to their multi-purpose characteristics such as milk production, good tolerance to a variety of harsh weather conditions, resistance to a host of diseases and parasites, easy fattening and good coat color traits. This agreed with the report of Devendra (2001) who reported that, agro pastoralists have preference for White Fulani (Bunaji) cattle because of their reputation for higher milk production, faster growth rate, large body size and good temperament.

Herd size distribution within the study area indicated that majority of the farmers (25%) kept between 30-39 cattle in their herd. This finding collaborate with the report of Devendra (2001) who disclosed that relative number of 30-100 is mostly kept by smallholder dairy farmers experiencing feed scarcity, less feeding managements and unimproved health care.

This finding revealed that artificial insemination is not practically adopted in the area due to lack of facilities and tradition believe. The implication of this finding is that the adoption of artificial insemination technology by cattle farmers in Kaduna State is a function of the farmers' educational attainment. This can be explained by the fact that an educated farmer tends to be more exposed to new ways of doing things because of his level of interaction with the world outside his immediate milieu. This fact allows him to welcome change as soon as it is introduced in the locality. This is in consonance with works done in other studies that had to do with the adoption of agricultural innovations (Voh, 1984; Akinola, 1986; Asifat, 1986) shared the same sentiments when they reported that there existed a positive relationship between level of education and adoption of farming innovations.

Table 1: Herd characteristics of dairy farmers in Sabon Gari and Giwa local government areas of Kaduna State

Parameter	Kaje		Rafinsidi		Rugarfulani		Sabon fegi		Idasu		Kaya	
	freq.	%	freq.	%	freq.	%	freq.	%	freq.	%	freq.	%
Type of animal kept												
Cattle	14	56	10	62.4	8	72.7	22	84.6	10	55.6	2	50
Cattle and Sheep	8	32	5	31.3	1	9.1	4	15.4	4	22.2	-	-
Cattle and Goats	-	-	-	-	1	9.1	-	-	3	16.6	-	-
Cattle, sheep and goat	3	12	1	6.3	1	9.1	-	-	1	5.6	2	50
Breed of Cattle												
White Fulani (Bunaji) only	14	56	11	68.7	6	54.5	15	57.7	10	55.6	3	75
Sokoto-Gudali only	3	12	2	12.5	4	36.4	4	15.4	4	22.2		
Mixed	8	32	3	18.8	1	9.1	7	26.9	4	22.2	1	25
Herd Size (cattle)												
10-19	5	20	1	6.3	1	9.1	9	34.7	3	16.7	2	50
20-29	7	28	7	43.6	3	27.2	6	23.1				
30-39	9	36	5	31.3	4	36.4	4	15.4	3	16.7	1	-
40-49	2	8	1	6.3	2	18.2	4	15.4	7	38.8		25
50-59	2	8	2	12.5	1	9.1	1	3.8	2	11.1	1	25
60-59	-	-	-	-	-	-	1	3.8	-	-	-	-
70-79	-	-	-	-	-	-	-	-	-	-	-	-
80-89	-	-	-	-	-	-	1	3.8	-	-	-	-
>90	-	-	-	-	-	-	-	-	3	16.7	-	-
Purpose of keeping the Animal												
Milk production	7	28	7	43.7	-	-	9	34.6	2	11.1	-	-
Milk and Asset	11	44	-	-	6	54.5	4	15.4	5	27.8	1	25
Milk and Social status	2	8	5	31.3	-	-	1	3.8	4	22.2	-	-
Multi-purpose	5	20	4	25	5	45.5	12	46.2	7	38.9	3	75
Breeding system												
Random mating	100	100	100	100	100	100	100	100	100	100	100	
Artificial insemination	-	-	-	-	-	-	-	-	-	-	-	

Milk production characteristics of dairy farmers in Sabon Gari and Giwa local government areas of Kaduna State is presented in Table 2. Number of animal lactating cows revealed that the highest frequency of 13, 12 and 10 (Kaje, Sabon Fegi and Rafinsidi) had a lactating cow between 6-10 in their herd. In contrast, 67% of the farmers from Idasu village had 1-5 lactating cows in their herd.

Majority of the farmers in all the six locations were found to harvest the milk for both selling and house consumption with 100% of farmers from Kaje, Rugar Fulani and Sabon Gari while 81.3% and 94% from Rafin Sidi and Idasu village, respectively dispose (sell) their milk and reserve some for household consumption.

The milk yield of 2-2.5 litres as shown in Table 2 is obtained from each cow per day by the majority of the respondents with 82% from Rugar Fulani while 73%, 52%, 50% and 44% from Sabon Fegi, Kaje, RafinSidi and Idasu, respectively.With regard to milk wastage, majority of farmers in the Kaje and Idasu villages were experiencing milk wastage with 100% from Kaya, 80% (Kaje) and 72% (Idasu) were having the problem of milk wastage. The milking system of all the farmers interviewed were hand milking system as they can't afford the milking machine and even if they can, there is no stable power supply. In addition, the milk productivity of the herds does not justify the use of milking machine. However, it the male members of the households that were milking the lactating cows which is contrast to what is obtainable in the remote village Yuan *et al*. (2010). The reason for milk wastage as observed in some of the villages could be associated to the lack of buyers and storage facilities. In contrast, 100% from Sabon Fegi, 87.5% (Rafinsidi) and 73% (Rugar Fulani) had no problem of milk wastage after harvest. Milk production (dairy) is characterized by low yield and poor milk hygiene. Low milk yield or production could be attributed to the use of indigenous breeds of cattle. The result of milk production is in agreement with the report of Yuan *et al*. (2010) who reported that the genotype of the African breeds of cattle can only produce an average milk of 1.27-3 litres per cow per day during the wet season and less than 0.36-1 during dry season.

Table 2: Milk production characteristics of dairy farms in Sabon Gari and Giwa local government areas of Kaduna State

Parameter	Kaje		Rafinsidi		Rugarfulani		Sabon fegi		Idasu		Kaya	
	freq.	%	freq.	%	freq.	%	freq.	%	freq	%	freq.	%
Number of lactating cow												
1-5	9	36	4	25	4	36	11	42	12	67	2	50
6-10	13	52	10	62.4	6	55	12	46	6	33		50
11-15	3	12	1	6.3	1	9.1	2	7.5			2	
16-20	-	-	1	6.3	-	-	1	3.8	-	-	-	-
Milk Disposal												
For sale only	-	-	3	18.7	-	-	-	-	-	-	-	-
For consumption only	-								1	5.6	2	50
Both	25	100	13	81.3	11	100	26	100	17	94	2	50
Average milk yield/head/day												
1-1.5	11	44	7	43.7	1	9.1	3	12	7	39	4	100
2-2.5	13	52	8	50	9	82	19	73	8	44	-	-
>=3	1	4	1	6.3	1	9.1	4	15	3	17	-	-
Respond to milk wastage												
Yes	20	80	2	12.5	3	27	-	-	13	72	4	100
No	5	20	14	87.5	8	73	26	100	5	28	-	-
Total	**25**	**100**	**16**	**100**	**11**	**100**	**26**	**100**	**18**	**100**	**4**	**100**

CONCLUSION AND RECOMMENDATION

Most of the farmers keep animals (especially cattle) for multiple purposes; they harvest milk for house consumption and sell some portion to overcome other household expensive. The average milk yield obtained per day per cow was found to be 1.5-3 litres depending on the season and feed availability. State governments, federal government and other donors need to allocate more resources toward smallholder dairy enhancement particularly in the areas of feed management, water provision, animal's health managements and security personnel. Policy makers and stakeholders should also consider constructing more milk collection centers near the smallholder dairy farmers in order to reduce the distance travelled to deliver milk to the market. This will have a positive effect on milk production as more than half of the milk produced is from the smallholder dairy sector.

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