

CATTLE MILK PRODUCTION CHARACTERISTICS AMONG AGRO-PASTORALISTS IN NORTH WEST NIGERIA

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ABSTRACT

This study was conducted on cattle milk production characteristics among agro-pastoralists in North West Nigeria. The study described the socio-economic distribution of cattle milk producers and evaluated the cattle milk production techniques in the study area. A three stage (multi-stage) sampling technique involving a combination of purposeful, random and snow ball sampling were used to select 157 respondents. Data were collected from sampled population using structured questionnaire. The data obtained were analysed using descriptive statistics which include frequency counts and percentages. The study showed that most of the respondents (81.3%) were involved in rearing of cattle used for milk production as agro-pastoralists. The overall average number of cattle per herd in the study area was 17 heads of cattle. Labour for extraction of milk was majorly provided by men (80.6%) based on the overall analysis of the four States considered. Average milk per herd per day is 9 litres. About 24% of the respondents however obtained more than 15.5 litres of milk per herd per day. The milk production among agro-pastoralists in this study is characterized with low output of 9 litres per day. However, the agro-pastoralists in North West Nigeria have great potentials of youthful age of milk producers (average of 36 years) and long years of experience in milk production. Technologies for increased milk productivity like feeding balanced ration, breeding and selection of improved stocks, adequate health care and disease control need to be packaged and promoted among agro-pastoralists in North West Nigeria.

Keywords: Agro Pastoralists, Milk Production, Northwest Nigeria, Fulani Households.

INTRODUCTION

Milk is one of the major products from cattle production. The primary purpose of milk from mammals is for feeding the young ones. However, the quantity of milk produced during a lactation cycle (about 300 days) is more than enough for just one calf per cow. The excess is normally harvested and processed for human consumption. The socio-economic outlook of indigenous groups like *Borani*, *Fulani*, *Maasai* and *Tuareg* have a strong historical link to cattle production, and by connection, milk production (Ndambi *et al.*, 2007). Traditional systems is the most common method of milk production which supply considerable amount of milk to rural and peri-urban populace of Sub-Saharan Africa (Olaloku and Debre, 1992; Mayberry *et al.*, 2017). In Nigeria, the bulk of smallholder production of milk is from the *Fulanis*. They are mainly from Northern Nigeria and mostly engaged in nomadic pastoral cattle production system which is characterized by little or no crop production and by high mobility of people and their animals in search of grazing pasture and water. However, there are large population of settled cattle herders in Nigeria. These settled herders are engaged in cattle rearing alongside crop production. Their traditional production system of is termed agro-pastoralism.

Ndambi *et al.* (2007) described the agro-pastoral system as an improvement on pastoral system, whereby cattle owners also cultivate crops in order to diversify production and reduce risks. The farmers here are sedentary, unlike the pastoralists who are mobile. They also graze their animals on communal grazing land, feed crop residues and also feed more supplements to their cattle than pastoralists. Due to population growth, land shortage and increasing interest in production and consumption; market-oriented dairy systems (a form of intensive use of capital and labour) are now evolving, with the use of high performing graded animals and/or higher inputs.

Several international bodies (Heifer Project International, Land O'Lakes, Send a Cow, etc) have developed strategies to promote milk production in African countries. These bodies usually have two main objectives: improving on milk consumption especially by poor families (nutrition improvement) and increasing on farm returns from dairy farming (income generation and poverty alleviation). An attempt to unbundle the individual component of cattle milk production value chain will first of all requires understanding the characteristics of the production system and its potentials as well as the socio-economic distributions of the stakeholders. This study was therefore aimed at evaluating the cattle milk production characteristics among agro-pastoralists in North West Nigeria. The specific objectives of the study were:

- (1.) To describe the socio-economic distribution of cattle milk producers in North West Nigeria.
- (2.) To evaluate the cattle milk production techniques among agro-pastoralists in North West Nigeria.

METHODOLOGY

The study was carried out in North West Nigeria. This region is made up of seven States namely: Jigawa, Kaduna, Katsina, Kano, Kebbi, Sokoto and Zamfara State. The study was conducted in Jigawa, Kaduna, Kano and Katsina States purposively selected based on the high concentration of agro-pastoralists. The North Western zone has an annual mean rainfall of between 750 mm to 11624 mm and annual mean temperature of 28⁰ – 52⁰C. The weather in most parts of the North West region of Nigeria is divided into four: late dry (January – March), early wet (April – June), late wet (July – September) and early dry (October – December). A three stage (multi-stage) sampling technique involving a

combination of purposeful, random and snow ball sampling was used to collect data for the target population out of sampled agro-pastoral households.

The first stage is the purposive selection of four (4) States. The four States were selected purposively with due consideration of distinct agro-ecological conditions, agro-pastoralists presence, future development project programming, logistics, and resource availability. In the second stage two (2) Local Government Areas (LGAs) from each of the State were purposively selected. The selection of these LGAs was based on the high population of agro-pastoralists in those areas (Table 1). The third stage involves the use of snowball sampling method for the selection of

communities where agro-pastoralist were interviewed using structured questionnaire. Two communities were selected per LGA. Ten respondents (agro-pastoralists) were intended to be interviewed per community using snowball sampling method. However, less than 10 (6 respondents) were interviewed at Daka Tsale in Wudil LGA of Kano State. Also 11 respondents were interviewed at Tsiga in Bakori LGA of Katsina State. In all, a total of 157 respondents were interviewed using structured questionnaire. The survey instrument was pre-tested and subjected to face validity. The distribution of the communities from which agro-pastoralists were interviewed is shown in Table 1. The data obtained were analysed using descriptive statistics of frequency counts and percentages.

Table 1: State, Local Government Areas and community of agro-pastoralist interviewed for the study

State	Local Government Area (LGA)	Communities	Number of respondents per LGA
Jigawa	Kiyawa	Kiyawa, Karfawa	20
	Birni Kudu	Sardauna, Kwari	20
Kaduna	Zaria	Kake, Detu	20
	Sabon Gari	Hauwa, Tudun Fulani	20
Kano	Kumbotsu	Kureken Sani, Panshekara	20
	Wudil	Kura, Daka Tsale	16
Katsina	Bakori	Bakori, Tsiga	21
	Jibia,	Kuza, Mazanya	20
Total			157

RESULTS AND DISCUSSION

Table 2 showed the socio-economic characteristics of milk producers in the study area. The females (51.3%) were almost equal to the males (48.7%). The women in most agro-pastoral households have turned their traditional involvement in milk production into an economic opportunity and serve as cattle milkmaids. The average age of farmers was 36 years. Very large proportions of these farmers are between 15 to 45 years of age. About (90%) of the agro-pastoralists in Kaduna States are within this age group while 88.6%, 80% and 77.3% are also between 15 to 45 years in Kano, Katsina and Jigawa States, respectively. Desalenge (2016) reported similar age between 18 to 50 years as age of farmers in milk value chain in Ethiopia. Sani (2006) also reported an average age of 40 years for milk producers in Kaduna State.

Most of the respondents (83.3%) are married with an average household size of 9 persons. More than half (59.1%) of them had Quranic education only. However, about 20% did not have any form of education. The occupational activities of the respondents presented in Table 2 showed that about 54% actively practiced crop production alongside cattle rearing.

Some are engaged as cattle farmers using extensive system of production (10.4%) and about 30% are milk processors. In a study on Fulani agro-pastoralists in Central Nigeria, Waters-Bayer (1988) found that dairy production units had modal household sizes of between 7 and 13 persons with almost equal males and females and 45% of members above 18 years. The average year of experience of respondents in milk production is 20 years.

Cattle production characteristics in some North West States of Nigeria were presented in Table 3. Most of the respondents (81.3%) are involved in rearing the cattle used for milk production as agro-pastoralists. The high proportion of farmers in this study that practice mixed farming agrees with comment made by Somda *et al.*, (2004) that dairy production is to be seen as a component of the farming system, in which dairy and crop enterprises are associated and mutually beneficial. Gryseels (1988) also stated that smallholder dairy production can be improved without affecting the primary function of animals and could be attractive in mixed farming system, as it offers the opportunity to diversify operations, spread risk and provide income.

Almost all the respondents (97.76%) engaged in milk production. Agro-pastoral system of livestock production produces milk from livestock system integrated with crop production which is characterized by low input, semi-extensive grazing with the land and labour as the major factor of production. Some few farmers used intensive system of cattle production. About 9 and 13% among farmers in Katsina and Kano States, respectively reared cattle using zero grazing (intensive) system. The minimum milk yield per herd in this study was 2 litres per herd as recorded by 22.3% of the

respondents. The maximum milk yield of 17 litres per herd per day was also recorded by 23.6% of the respondents. However, the average milk per herd per day was 9 litres for the entire population considered in this study. About 24% of the respondents however obtained more than 15.5 litres of milk per herd per day. An average cow was reported to produce 1 litre of milk a day (Ochelle, 2016). Shittu *et al.* (2008) reported 23.78 litres of milk per herd per day from dairy farms where the animals were kept intensively.

Table 2: Socio-economic characteristics of milk producers, processors and marketers in some North-West States of Nigeria

Variable	Frequency (%)					Pooled Average
	Jigawa	Kaduna	Kano	Katsina	Pooled	
Sex						
Male	20 (52.6)	19 (47.5)	16 (44.4)	20 (50.0)	75 (48.7)	
Female	18 (47.4)	21 (52.5)	20 (55.6)	20 (50.0)	79 (51.3)	
N	38	40	36	40	154	
Age of respondents						
15-25	8 (21.1)	10 (25.0)	4 (11.4)	7 (17.5)	29 (19.0)	36 years
26-35	10 (26.3)	15 (37.5)	12 (34.3)	14 (35.0)	51 (33.3)	
36-45	11 (28.9)	11 (27.5)	15 (42.9)	11 (27.5)	48 (31.3)	
46-55	7 (18.4)	3 (7.5)	0 (0.0)	6 (15.0)	16 (10.5)	
56-65	2 (5.3)	1 (2.5)	2 (5.7)	2 (5.0)	7 (4.6)	
66-75	0 (0.0)	0 (0.0)	2 (5.7)	0 (0.0)	2 (1.3)	
N	38	40	35	40	153	
Marital status						
Single	2 (5.3)	5 (12.5)	1 (2.8)	0 (0.0)	8 (5.2)	
Married	32 (84.2)	31 (77.5)	28 (77.8)	38 (95.0)	129 (83.3)	
Widow	2 (5.3)	3 (7.5)	3 (8.3)	1 (2.5)	9 (5.8)	
Divorced	2 (5.3)	1 (2.5)	4 (11.1)	1 (2.5)	8 (5.2)	
N	38	40	36	40	154	
House hold size						
Small (2-6)	4 (10.8)	26 (76.5)	6 (17.1)	10 (26.3)	46 (31.9)	9
Medium (7-11)	18 (48.6)	6 (17.6)	14 (40.0)	16 (42.1)	54 (37.5)	
Large (12-16)	12 (32.4)	2 (5.9)	10 (28.6)	10 (26.3)	34 (23.6)	
Very large (≥ 17)	3 (8.1)	0 (0.0)	5 (14.3)	2 (5.3)	10 (6.9)	
N	37	34	35	38	144	
Education status						
Quranic education	17 (44.7)	36 (90.0)	13 (36.1)	25 (62.5)	91 (59.1)	
Primary	3 (7.9)	0 (0.0)	0 (0.0)	11 (27.5)	14 (9.1)	
Secondary	0 (0.0)	3 (7.5)	2 (5.6)	4 (10.0)	9 (5.8)	
Tertiary	0 (0.0)	0 (0.0)	8 (22.2)	0 (0.0)	8 (5.2)	
No any form of education	18 (47.4)	1 (2.5)	13 (36.1)	0 (0.0)	32 (20.8)	
N	38	40	36	40	154	
Primary occupation						
Civil servant	0 (0.0)	0 (0.0)	3 (8.3)	4 (10.0)	7 (4.5)	
Trader	0 (0.0)	0 (0.0)	2 (5.6)	0 (0.0)	2 (1.3)	
Farmer (mixed farming)	23 (60.5)	19 (47.5)	15 (41.7)	26 (65.0)	83 (53.9)	
Cattle rearer	3 (7.9)	4 (10.0)	9 (25.0)	0 (0.0)	16 (10.4)	
Processor	12 (31.6)	17 (42.5)	7 (19.4)	10 (25.0)	46 (29.9)	
N	38	40	36	40	154	
Year of experience in dealing with milk						
1-5	5 (13.2)	1 (2.6)	2 (5.9)	0 (0.0)	8 (5.3)	20 years
6-10	3 (7.9)	5 (12.8)	8 (23.5)	6 (15.0)	22 (14.6)	
11-15	7 (18.4)	10 (25.6)	8 (23.5)	6 (15.0)	31 (20.5)	
16-20	3 (7.9)	6 (15.4)	0 (0.0)	7 (17.5)	16 (10.6)	
21-25	7 (18.4)	5 (12.8)	9 (26.5)	7 (17.5)	28 (18.5)	
26-30	8 (21.1)	5 (12.8)	4 (11.8)	3 (7.5)	20 (13.2)	
Above 30	5 (13.2)	7 (17.9)	3 (8.8)	11 (27.5)	26 (17.2)	
N	38	39	34	40	151	

N = Number of observation; Values in parenthesis are percentages

Table 3: Cattle production characteristics in some States of North-West Nigeria

Variable	Frequency (%)					
	Jigawa	Kaduna	Kano	Katsina	Pooled	Polled average
Do you rear cattle?						
Yes	36 (94.7)	37 (92.5)	31 (86.1)	30 (75.0)	134 (87.0)	
No	2 (5.3)	3 (7.5)	5 (13.9)	10 (25.0)	20 (13.0)	
N	38	40	36	40	154	
Obtaining milk from your lactating cows						
Yes	36 (100)	37 (92.5)	31 (86.1)	27 (90.0)	131 (97.76)	
No	0 (0.0)	0 (0.0)	0 (0.0)	3 (10.0)	3 (2.24)	
N	36	37	31	30	134	
Major activities involved in by farmers						
Milk production	20 (52.6)	21 (52.5)	22 (61.1)	22 (55.0)	85 (55.2)	
Milk processing	6 (15.8)	19 (47.5)	3 (8.3)	13 (32.5)	41 (26.6)	
Milk marketing	12 (31.6)	0 (0.0)	11 (30.6)	5 (12.5)	28 (18.2)	
N	38	40	36	40	154	
System of cattle rearing						
Extensive	4 (11.1)	7 (18.9)	8 (25.8)	0 (0.0)	19 (14.2)	
Agro-pastoralist	32 (88.9)	30 (81.1)	19 (61.3)	28 (93.3)	109 (81.3)	
Intensive (zero grazing)	0 (0.0)	0 (0.0)	4 (12.9)	2 (6.7)	6 (4.5)	
N	36	37	31	30	134	
Quantity of milk per herd (litre)						
0.5 to 3.5	2 (5.6)	4 (10.8)	6 (19.4)	23 (76.7)	35 (26.1)	9 litres
3.5 to 6.5	5 (13.9)	9 (24.3)	3 (9.7)	1 (3.3)	18 (13.4)	
6.5 to 9.5	9 (25.0)	5 (13.5)	7 (22.6)	5 (16.7)	26 (19.4)	
9.5 to 12.5	7 (19.4)	2 (5.4)	4 (12.9)	1 (3.3)	14 (10.4)	
12.5 to 15.5	6 (16.7)	1 (2.7)	2 (6.5)	0 (0.0)	9 (6.7)	
Above 15.5	7 (19.4)	16 (43.2)	9 (29.0)	0 (0.0)	32 (23.9)	
N	36	37	31	30	134	

N = Number of observation; Values in parenthesis are percentages

Table 4 showed the distribution of cattle used for milk production in the study area. The overall average number of cattle per herd in the four States (Jigawa, Kaduna, Kano and Katsina) is 17 heads of cattle. However, the average herd size was highest in Jigawa State (21 heads of cattle) when each of the States was considered. The least number of cattle was found in Katsina State with 5 heads of cattle per herd. Kano and Kaduna States had 17 and 18, respectively as the average herd size. The average distribution of bulls in Jigawa, Kano, Kaduna and Katsina were 15, 10, 6 and 6, respectively. The average distribution of bulls in Jigawa, Kano, Kaduna and Katsina States was 15, 10, 6 and 6, respectively.

The average herd size in this study was lower than 41.5 presented by Akpa *et al.* (2012) as the mean herd size for *Fulani* households in Zaria, Kaduna State. Iro (2009) stated that herd size of cattle in a particular location is dependent on prevailing environmental condition, biological capacity (performance of the species), herd management practices, resource use and distribution. The populations surveyed in

this study were majorly sedentary in nature with interest in some other agricultural ventures apart from cattle rearing.

The distributions of labour use for milk production in the study area are shown in Table 5. Labour for extraction of milk was majorly provided by men (80.6%) based on the analysis of the pooled data from the four States considered in this study. In Kaduna and Kano States, the extraction of milk from cows was almost carried out by men with 94.6 and 93.5%, respectively. Labour for this activity was however provided almost equally by men (53.3%) and women (46.7%) in Katsina State.

Labour for breeding of cattle was done solely by men in Jigawa, Kaduna and Kano. The overall proportion for this activity was 98.3% because some women were involved in breeding of cattle in Katsina State (18.2%). Selection of grazing sites was majorly done also by men. Children and women are completely excluded from this activity. More men (89.6%) were however involved in this selection grazing sites

for cattle than children (10.4%). Grazing of cattle stocks was nearly equally performed by men (52.5%) and children (47.5) when the activity was considered in all the four States combined. In specific terms, more children (74.2%) were involved in grazing of cattle stocks in Kano State than men (25.8%). For profitable venture into any agricultural enterprise, labour needs to be considered and valued in monetary terms. Most pastoralists and agro-pastoralists do not consider family labour in relation to what it actually cost. The milk production characteristics in this study is traditional in outlook. In Development Economics, labour of smallholder agricultural ventures is expected to be cost and earned in principle by the farmers. President of Irish Creamery Milk Supplier Association (ICMSA), John Comer, encouraged

milk producers to carry out detailed analysis of full costs associated with the production of milk in Ireland (ICMSA, 2016). Grandin *et al.* (1991) stated that men spent an average of 5.5 hours a day on livestock-related work while women spent an hour and half on livestock management and just over an hour on milking. This information corroborated the results obtained in this study which indicated that milk production, processing and marketing is a family-based venture in North West Nigeria. Food and Agriculture Organization (FAO) (2011) stated that women make up an average of about 43% of the agricultural labour force and contribute substantially to the livestock management. Milking of cattle is the major aspect of milk value chain that women are mostly engaged in (Okali, 1985; Thornton, 2001).

Table 4: Distribution of cattle used for milk production in some States of North-West Nigeria

Variable	Frequency (%)					Polled average
	Jigawa	Kaduna	Kano	Katsina	Polled	
Cattle herd size						
2-6	0 (0.0)	1 (2.8)	2 (6.5)	18 (60.0)	21 (15.8)	17
7-11	1 (2.8)	7 (19.4)	2 (6.5)	10 (33.3)	20 (15.0)	
12-16	3 (8.3)	6 (16.7)	1 (3.2)	2 (6.7)	12 (9.0)	
17-21	13 (36.1)	5 (13.9)	8 (25.8)	0 (0.0)	26 (19.5)	
22 and above	19 (52.8)	17 (47.2)	18 (58.1)	0 (0.0)	54 (40.6)	
N	36	36	31	30	133	
Distribution of bulls in the herd						
1-10	33 (91.7)	30 (96.8)	24 (77.4)	30 (100)	117 (91.4)	7
11-20	3 (8.3)	1 (3.2)	4 (12.9)	0 (0.0)	8 (6.2)	
21-30	0 (0.0)	0 (0.0)	1 (3.2)	0 (0.0)	1 (0.8)	
41-50	0 (0.0)	0 (0.0)	2 (5.9)	0 (0.0)	2 (1.6)	
N	36	31	31	30	128	
Distribution of cows in the herd						
1-10	12 (33.3)	19 (51.4)	4 (12.9)	30 (100)	65 (48.5)	14
11-20	14 (38.6)	16 (43.2)	13 (41.9)	0 (0.0)	43 (32.1)	
21-30	9 (25.0)	2 (5.4)	7 (22.6)	0 (0.0)	18 (13.4)	
31-40	1 (2.8)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.7)	
41-50	0 (0.0)	0 (0.0)	1 (3.2)	0 (0.0)	1 (0.7)	
51-60	0 (0.0)	0 (0.0)	6 (19.4)	0 (0.0)	6 (4.5)	
N	36	37	31	30	134	
Distribution of calves in the herd						
1-10	25 (69.4)	21 (56.8)	18 (58.1)	8 (100)	72 (64.3)	10
11-20	11 (30.6)	10 (27.0)	8 (25.8)	0 (0.0)	29 (25.9)	
21-30	0 (0.0)	6 (16.2)	5 (16.1)	0 (0.0)	11 (9.8)	
N	36	37	31	8	112	
Number of lactating cows per year						
1-5	1 (3.0)	13 (35.1)	5 (16.1)	30 (100.0)	49 (37.4)	9
6-10	14 (42.4)	16 (43.2)	10 (32.3)	0 (0.0)	40 (30.5)	
11-15	12 (36.4)	6 (16.2)	7 (22.6)	0 (0.0)	25 (19.1)	
16-20	4 (12.1)	2 (5.4)	3 (9.7)	0 (0.0)	9 (6.9)	
Above 20	2 (6.1)	0 (0.0)	6 (19.4)	0 (0.0)	8 (6.1)	
N	33	37	31	30	131	

N = Number of observation; Values in parenthesis are percentages

Table 5: Distribution of engaged labour for milk production in some States of North-West Nigeria

Variable	Frequency (%)				Pooled
	Jigawa	Kaduna	Kano	Katsina	
Labour for extraction of milk from cows					
Men	28 (77.8)	35 (94.6)	29 (93.5)	16 (53.3)	108 (80.6)
Women	5 (13.9)	1 (2.7)	2 (6.5)	14 (46.7)	22 (16.4)
Children	3 (8.3)	1 (2.7)	0 (0.0)	0 (0.0)	4 (3.0)
N	36	37	31		
Labour for milk processing					
Men	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	1 (0.7)
Women	35 (97.2)	36 (97.3)	31 (100)	29 (96.7)	131 (97.8)
Children	1 (2.8)	1 (2.7)	0 (0.0)	0 (0.0)	2 (1.5)
N	36	37	31		
Labour for milk marketing					
Men	0 (0.0)	0 (0.0)	3 (9.7)	0 (0.0)	3 (2.3)
Women	25 (69.4)	34 (91.9)	27 (87.1)	26 (100)	112 (86.2)
Children	11 (30.6)	3 (8.1)	1 (3.2)	0 (0.0)	15 (11.5)
N	36	37	31	26	130
Labour for breeding of livestock					
Men	36 (100)	37 (100)	31 (100)	9 (81.8)	113 (98.3)
Women	0 (0.0)	0 (0.0)	0 (0.0)	2 (18.2)	2 (1.7)
N	36	37	31	11	115
Labour for selection of grazing sites					
Men	36 (100)	28 (75.7)	28 (90.3)	11 (100)	103 (89.6)
Children	0 (0.0)	9 (24.3)	3 (9.7)	0 (0.0)	12 (10.4)
N	36	37	31	11	115
Labour for grazing of stock					
Men	16 (44.4)	22 (59.5)	8 (25.8)	18 (100)	64 (52.5)
Children	20 (55.6)	15 (40.5)	23 (74.2)	0 (0.0)	58 (47.5)
N	36	37	31	18	122

N = Number of observation; Values in parenthesis are percentages

Table 6 showed purpose, derivable benefits and constraints of milk production in some States of North-West Nigeria. The combination of home consumption and sales of milk were the main purpose of milk production in Jigawa, Kaduna, Kano and Katsina States. This purpose accounted for about 84% of all the purposes stated by respondents. Home consumption and source of income were reported jointly as the highest benefit derivable from milk production, processing and marketing in all the four States considered. About 37% of all

the respondents interviewed in this study stated that the activities surrounding milk production had income generation for their households as the only benefit derivable from this venture. In Jigawa States, many respondents (83%) indicated that milk had some medicinal values when benefits of this community were considered. Enhancement of social status of respondents was reported as derivable benefits in Kaduna State by about 3% of the farmers interviewed.

Table 6: Purpose and derivable benefits of milk production in some States of North West Nigeria

Variable	Frequency (%)				Pooled
	Jigawa	Kaduna	Kano	Katsina	
Purpose of milk production					
Home consumption	0 (0.0)	1 (2.7)	0 (0.0)	9 (30.0)	10 (7.5)
Sales	0 (0.0)	1 (2.7)	6 (19.4)	5 (16.7)	12 (9.0)
Home consumption and sales	36 (100)	35 (94.6)	25 (80.6)	16 (53.3)	112 (83.6)
N	36	37	31	30	134
Benefit of milk production					
Home consumption	2 (5.6)	0 (0.0)	0 (0.0)	4 (13.3)	6 (4.5)
Source of income	7 (19.4)	26 (74.3)	9 (29.0)	7 (23.3)	49 (37.1)
Social status	0 (0.0)	1 (2.9)	0 (0.0)	0 (0.0)	1 (0.8)
Source of employment	0 (0.0)	3 (8.6)	0 (0.0)	0 (0.0)	3 (2.3)
Home consumption and income	21 (58.3)	5 (14.3)	19 (61.3)	19 (63.3)	64 (48.5)
Source of income and gift	3 (8.3)	0 (0.0)	3 (9.7)	0 (0.0)	6 (4.5)
Medicinal value	3 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	3 (2.3)
N	36	35	31	30	132

N = Number of observation; Values in parenthesis are percentages

CONCLUSION AND RECOMMENDATIONS

The milk production among agro-pastoralists in this study is characterized with low average output of 9 litres of milk per herd. However, the agro-pastoralists in North West Nigeria have great potentials for improved milk production. These potentials include youthful age of milk producers (average of 36 years) and long years of experience in milk production. Modern technologies for increased milk productivity need to be packaged and promoted among agro-pastoralists in North West Nigeria. This can be achieved by reinvigorating the

concept of dairy cluster cooperatives where improved support services like feeding balanced ration, breeding and selection of improved stocks, adequate health care and disease control can be accessed by milk production stakeholders.

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