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CHARACTERIZATION OF THE MILK VALUE CHAIN IN THE NIAMEY DAIRY BASIN (NIGER).

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ABSTRACT: this work is part of the thesis document on the milk value chain in the Niamey dairy basin. 484 actors were interviewed and the data were analyzed using the SPSS software version 17. This study shows that the dairy herd consists mainly of zebu breeds: Djéli (69%), Bororo (17%), Goudali (10%) and Azawak (4%). Six links characterize this value chain: input supply and support services, production, collection, processing, marketing (distribution) and consumption. Milk producers are small agro pastoral family farms as a whole. The size of the herd of farms comprises 10 to 20 heads with 2 to 5 dairy heads for a production of 1 to 5 liters per day. The collectors supply the collection centers through a well-defined network.
Key words: milk, dairy basin, Niamey.

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INTRODUCTION

Local milk is the main source of protein from animal production that is within reach of the population in sub-Saharan Africa [1]. The milk trade, in particular, generates thousands of jobs in the production sector, but also in processing and trade [2]. Mini dairies in Senegal create 272 direct jobs [3] and 21 jobs in the mini dairies of the Niamey dairy basin [4] for 246 farmers regularly supplying milk to these mini dairies. It represents a speculation for the future of agriculture in the sub-region. In Niger, milk is an essential component of the diet of pastoral and agro-pastoral populations. It plays a special role in the food security of populations [5] and is a regular source of income. Local milk is produced in different agro-ecological zones of Niger and according to different farming systems. According to national statistics, annual local milk production is estimated at nearly 3 million tones, of which 42% cow's milk, 35% goat's milk, 13% camel milk and 10% sheep's milk [6]. Compared to imported milk, local milk has the additional benefits for processing. It is valued for its organoleptic qualities, and is paid 1.5 to 3 times more than milk reconstituted from imported milk powder [2]. With the creation of collection centers and collection networks, milk has become a business center. It mobilizes a large number of stakeholders, and is the subject of major industrial investments (collection center, mini-dairies and dairies) based on forecasts of rapid growth in urban consumption. The city of Niamey is supplied by a dairy basin of about 150 km radius. Several actors with different interests intervene. This chapter aims mainly to characterize the local milk value chain in the Niamey dairy basin.

Delimitation of the area of the dairy basin

The dairy basin of Niamey is located in the western zone of Niger, including the city of Niamey and a part of the Tillabéry region including the departments of Kollo, Say and Torodi. It houses three milk collection centers that supply the dairy industries of Niamey with raw milk and the city's consumers with pasteurized milk, cheese and yoghurt. Each collection center is run by a dairy cooperative of village dairy farmers. The members of these cooperatives are small producers who supply the center through a collection network set up by the cooperatives. Figure 1 shows the dairy basin of Niamey. It indicates the dairy cooperatives and the villages that served for this work.

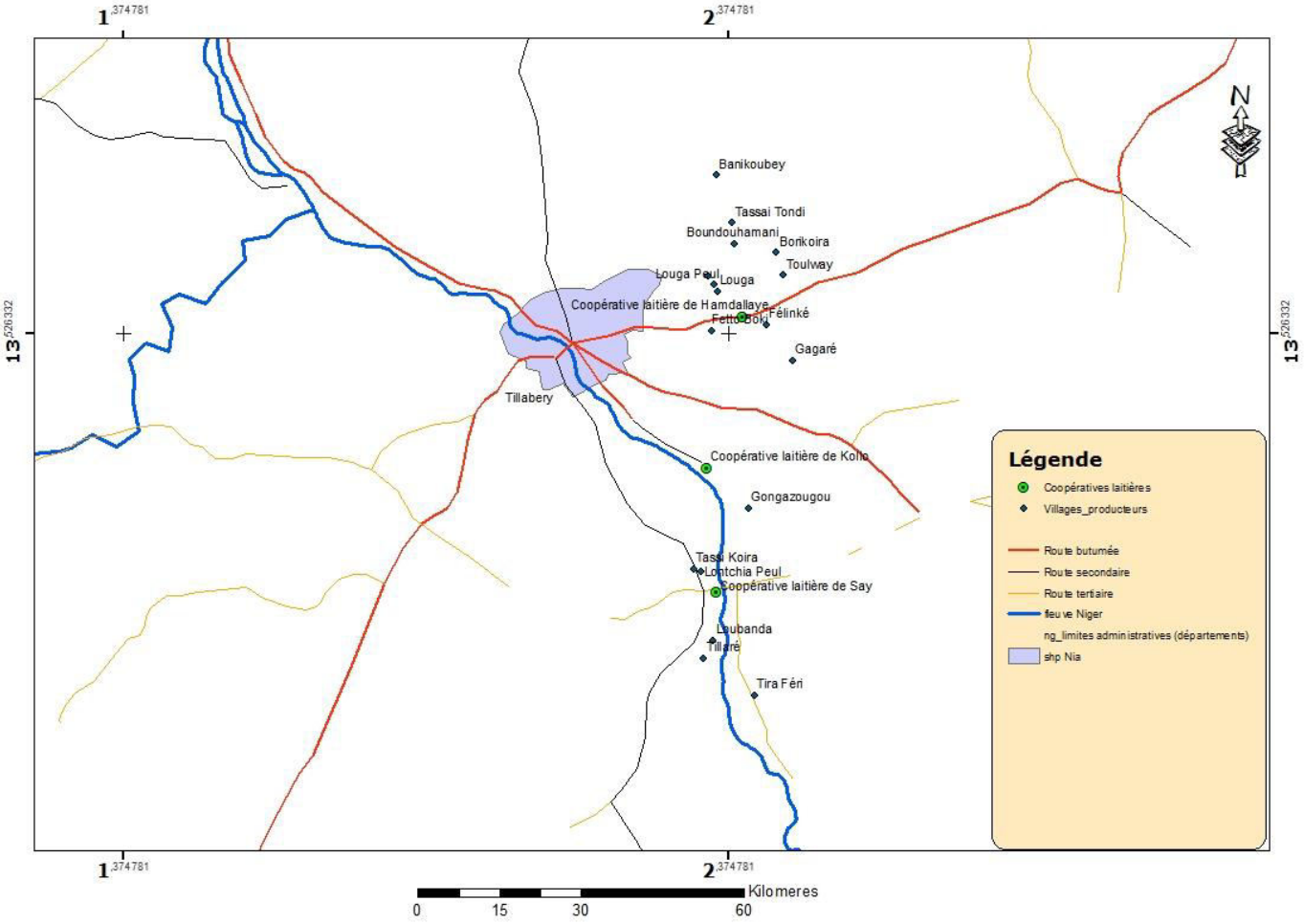


Figure 1: Niamey Dairy Basin

Sampling and data processing

This work was conducted with 484 actors in the milk value chain. There are 336 producers, 22 collectors and 126 consumers of milk and dairy products.

Data processing was done using Excel 2013 software for data entry and SPSS version 17 for descriptive analysis.

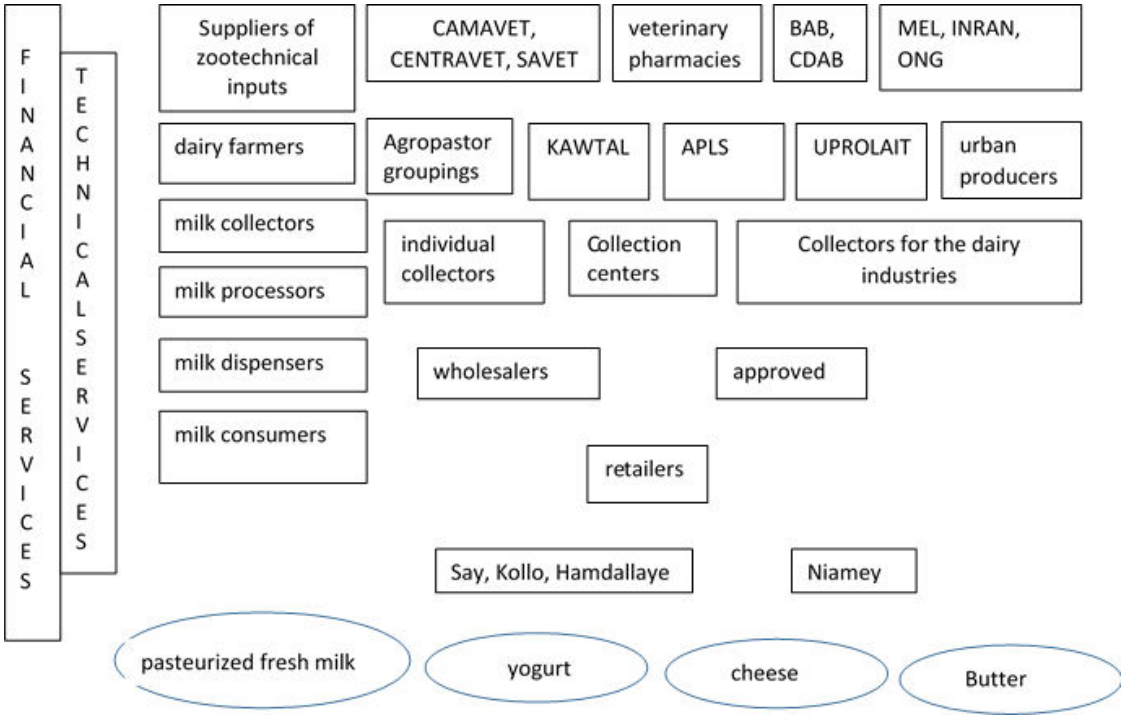
Herd structure

Data collected from agro pastoralists show that the herd consists of zebu breeds: Djéli (69%), Bororo (17%), Goudali (10%) and Azawak (4%) (Table 1).

Individual family farms with at least three to four cows and no more than fifteen cows carrying significant amounts of raw milk to collection centers and dairy industries.

The links in the milk value chain

The organization of the milk value chain of the Niamey Dairy Basin is presented in Figure 2. Six links characterize this value chain namely the supply of inputs and support services, production, collection, processing, marketing (distribution) and consumption.



Source: Author

Figure 2: Diagram of links in the milk value chain in the Niamey dairy basin.

Input supply and support services

This link is intended to provide producers with inputs (livestock feeds, lick pads) and veterinary services. It is made up of actors such as livestock feed traders, technical livestock services (STDE), the Private Veterinary Service of Proximity (SVPP) and its Auxiliary Para Veterinary (APV) network and microfinance institutions. Livestock feed traders are dairy cooperatives. The latter ensure the supply of zoo technical inputs and offer farmers to play the role of VPA under the supervision of SVPP or STDE depending on availability in the area. The sale of livestock feed is done at the level of the Livestock Feed Shops (BAB) installed at the level of each cooperative. Livestock Feed Distribution Boxes (CDAB) provide relay at the level of the member villages of the cooperative. The management of CDAB is ensured by a committee chaired by the VPA and whose treasury is ensured by the president of the group of village breeders. The other members of the group are all women.

Thus, there are three BABs (one per collection center), six distribution boxes around each BAB for a total of 18 CDABs. Ninety (90%) of the livestock feed buyers are dairy farmers who are members of the dairy cooperative. The 10% consists of other farmers who did not join the cooperative.

The major constraints of the BAB according to the producers surveyed (Table 1) are insufficient funds (31%), food quality (27.6%), road harassment (20.7%), lack of storage facilities (3.4%) and the high cost of inputs.

- SVPP and STDE provide the animal health service in the Niamey dairy basin. There is only one SVPP that is installed in Say and relies on a network of 14 VPAs. In other areas of the dairy basin, the role of the SVPP is provided by the STDEs, which are active in VPA management.

SVPP supplies VPAs with veterinary products and overseas sales and use, and STDEs provide supervision in accordance with the State's sovereign role.

This sub-link service and animal health suffers from the problem of dubious products introduced on local markets and in poor storage conditions. In fact, 32.3% of the farmer's surveyed claim to buy products from local market stalls.

- MFIs are the financial actors of the main links in the value chain. These actors most often accompany producers through collectors, VPAs and BABs. Rolling funds enabling collectors to collect milk are prefinanced by the MFIs, including CréditMutuel du Niger (CMN), ASUSU sa and Banque Agricole du Niger (BAGRI). Based on the collector's performance and a business plan (motorcycle purchase, working capital), the MFI provides the collector with a credit line of 500,000 FCFA. This amount is repayable over 12 months with an annual interest rate of 2%. To make it easier for the collector to repay this credit, the MFI takes into account the seasonality of low production production: that is to say that, during periods of low production, the collector may not make the payment regularly.

The BABs are also supported by these MFIs in the purchase of livestock feed at the same interest rate and a loan ranging from 500,000 to 2,000,000 FCFA. The same is true for VPAs whose credit does not exceed 300,000 FCFA.

Milk production

Dairy production is the work of the farmers who are members of the cooperatives. According to Table 1, they are all 85.1% male agropastorers. Their ages range from 19 to 78 years, 81% of whom are between 19 and 54 years old. The number of cows kept per producer varies from 5 to 15 cows. The total number of dairy cows expressed by breeders in the 22 villages surveyed is 1500 head. 93.2% of the producers are illiterate and heads of farms the vast majority (74.1%). Almost all married (99.1%), these producers have 82.7% as the main activity livestock.

Nearly 93% of producers give a food supplement during periods of low production. Strategic supplementation in dairy cows is based on agro-industrial by-products and agricultural residues. During periods of low production, the average number of 50 kg bags purchased per interviewed producer is 10 bags. In the same period the use of SPAI (Agro-industrial By-Products) increases from 38.2% in high production to 90% with an average of 15 bags.

Systematic deworming is done by 88.6% of producers and the average duration between two deworming periods is six (6) months.

For the deworming of animals, producers use VPAs (48.68%), informal vendors (16.4%) and technical livestock services (33.34%) as shown in Figure 3.

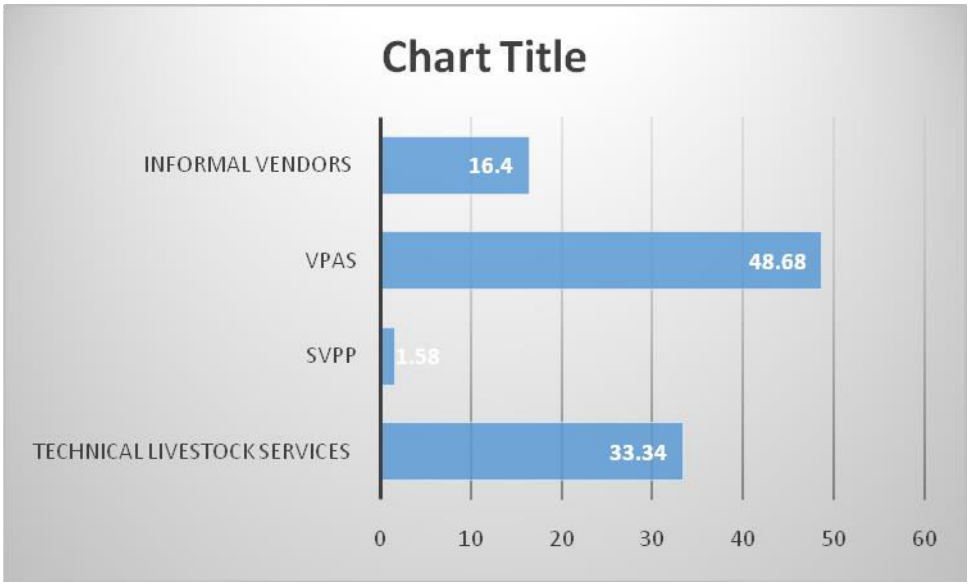


Figure 3: Breeders' Remedies to Deworming Services

The main services requested by the breeders are vaccination (34.3%), deworming (27.1%), vitamin purchase (16.3%), treatment (14.5%) and counseling (7.8%); (Table 1).

Regarding the level of satisfaction of services provided by VPAs, 98% of pastoralists who have used VPA services are satisfied. This is an asset for the SVPP network. However, 37.9% of the surveyed breeders say they do not use VPAs.

Collection

90.9% of milk is collected by Fulani whose age does not exceed 54 years (Table 1). 100% married, these collectors mostly learned to read the Koran (45.5%) and use 72.7% of motorcycles for milk collection (Table 1). In times of high production, collectors do not have to go far to collect milk. While in low production, some collectors triple the collection distance of high production to collect at most the same amount of milk collected in high production. With the creation of collection centers, the Niamey dairy basin has more than 22 collection circuits. The determination of these circuits is based on several factors. First of all, there is the means of transport used: depending on whether the collector is on a motorbike or bicycle or even carried, the distance to be covered is not the same and the quantity of milk is also different. Then the state of the road to take: even if the means of transport make it possible to go far in record time, the state of the road limits the circuit because not being able to free certain areas. Finally the social links: they are very important in Fulani environment because according to the knowledge of the environment and the family ties of the collector, it will be much more accepted. Thus, short, medium and long collection networks are determined. During the months of March to August corresponding to the period of scarcity of milk in the dairy basin, the collection circuits are longer: 10% more than the ordinary distance at least for each collector. This distance increase is an initiative for each collector to maintain at least three quarters of his collection of high production period. The collectors, with rolling stock, receive the raw milk from the producers and send it to the collection centers. Each collector has at least one bike. We can distinguish "primary collectors", who collect milk from production sites to places that we can call "collection points", where the milk is taken by "secondary collectors" equipped with motorcycles. The latter transport the milk to the collection centers.

Some collectors who are more professional than others have working capital, with which they manage to buy milk by cash. They then fully assume the risks relating to the alteration of the milk. Other collectors take milk on credit and pay producers once they have received their paychecks from collection centers or processing units. The risk is then borne by the producer, who in case of non-acceptance of the milk is not paid.

The collection capacity varies according to the means of transport used (bike, motorcycle). It is between 20 and 225 liters. The containers used for collection are the plastic recovery cans of various origin (including cans of edible oils). These are suitable for transport by bicycle or motorcycle, but have major health disadvantages, given their difficulty cleaning aseptic.

Despite the efforts made by the projects and the collection centers, some of the milk delivered is not accepted because of its poor quality. The milk refused for lack of quality is located according to investigations between 2 and 10% of the milk presented per day. The reasons for rejection include poor conditions of milking, collection and transportation (cleanliness of the hands of the milker and the milk collection container); poor storage conditions; the excessive duration of the transfer due to the lack of a practicable road network and unsuitable transport conditions.

Marketing raw milk

Collectors generally buy a liter of raw milk from producers between 175 and 300 CFA depending on the period, the collection center and the distance. They resell it between 300 and 350 CFA depending on the collection center. As for the collection centers, they deliver the milk to 350 FCFA for the dairy industries after cooling and those taking it at 350 F CFA transform it into yoghurt, fresh milk or cheese (Nigerella). At the level of some villages in the dairy basin, the women organized in groups transform evening production into curdled milk. At the collection centers, 30% of the milk collected is processed into pasteurized milk and liquid yoghurt sold in the capital's supermarkets. The liter of yoghurt is sold at 1000 FCFA and that of pasteurized milk at 500 FCFA.

Transformation

The main processing products are fresh milk and liquid yoghurt. Surveys have shown that the production of cheese (Nigerella) is only made by the collection center collecting at 350 F CFA per liter. The other collection centers process raw milk volumes estimated at 20% of their collection per day. The resulting products are pasteurized milk and liquid yoghurt. 80% of the local milk collected is sent to the dairy industries of Niamey.

Consumption of dairy products

All the consumers questioned claim to consume local raw milk or its by-products (pasteurized milk or yoghurt). 89.7% of these consumers are men aged 66 and over. They are of various ethnicities (50% Zarma) and of multiple educational level with a predominance of secondary level (18.3%). Figure 4 shows the different dairy products consumed.

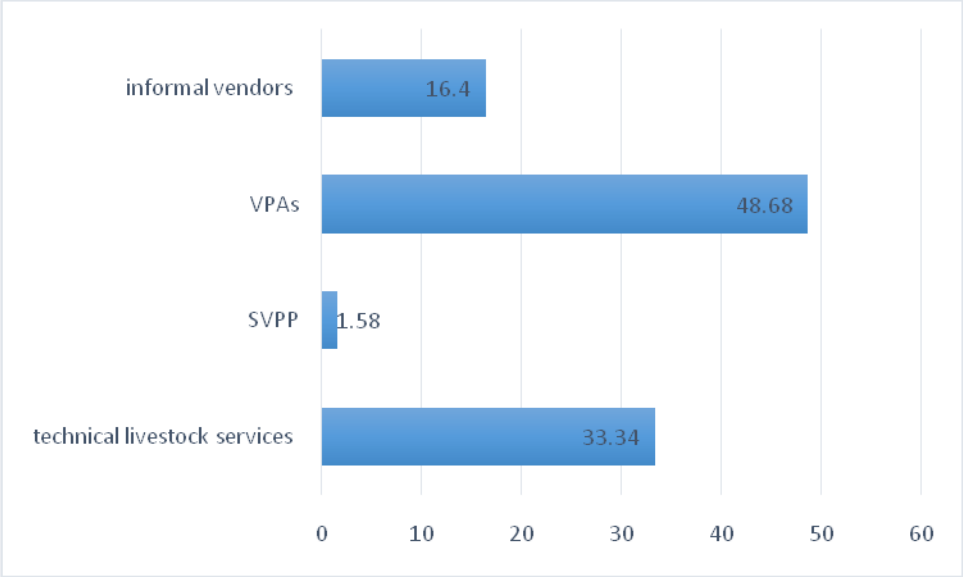


Figure 4: Distribution of different dairy products

It is found that pasteurized milk is the most consumed in Niamey with 59.5% of consumers interviewed, followed by yogurt with 33.3% followed by cheese (Nigerella) and raw milk with respectively 4, 8 and 2.4%. The pasteurized milk consumed is mainly marketed in supermarkets and small dealers in the city of Niamey. Pasteurized milk is packaged in plastic bags of 500 milliliter sold at a price (consumer) ranging from 300 to 500 FCFA depending on the point of sale. According to the survey data, 21,500 liters of pasteurized milk were sold during the month of July 2016 from the three collection centers. This quantity represents only the sale to the distributors of the products of the collection centers. It does not concern quantities directly sold to consumers from collection centers. At the household level, consumers of local milk by-products are mainly under 31 years old and account for 51% of the total.

89.7% of the consumers are men and the main reason consumers have for the local milk by-products is the taste and its nutritiousness cited 100 times out of 126. More than 80% of the consumers interviewed have at least the primary level.

Table 1: Economic social profiles of the actors

		Frequency	Valid Percent
Producers			
Sex	Male	286	85,1
	Female	50	14,9
	Total	336	100
Age range of the respondent	19-30	48	14
	31-42	128	38
	43-54	98	29
	55-66	52	15
	67-78	10	4
	Total	336	100
Level of education	without level	313	93,2
	Adult courses	1	0,3
	Incomplete primary	9	2,7
	Koranic school	11	3,3
	Way	1	0,3
	Secondary	1	0,3
	Total	336	100
Status of the respondent in the concession / operation	Chief Operating Officer	249	74,1
	Independent head of household	22	6,5
	Dependent head of household	9	2,7
	Member of the household	10	3
	CE woman or head of household	46	13,7
	Total	336	100
Marital status of the respondent	Married)	333	99,1
	Single	3	0,9
	Total	336	100
Core business	Agriculture	58	17,3
	Breeding	278	82,7
	Total	336	100
Herd structure	Djéli	232	69
	Bororo	57	17
	Goudali	34	10
	Azawak	13	4
	Total	336	100
Use of VPAs	Vaccination	115	34,3
	deworming	91	27,1
	Purchase vitamins	95	16,3
	Treatment	49	14,5
	Board support	26	7,8
	Total	336	100

BAB constraints	Insufficient funds	104	31
	Quality livestock feed	93	27,6
	Road hassles	36	10,7
	Insufficient storage infrastructure	103	30,7
	Total	336	100
collectors			
Age range of the respondent	19-30	4	18
	31-42	12	55
	41-54	6	27
	Total	22	100
Ethnicity of the respondent	Peulh	20	90,9
	Touareg	1	4,5
	Zarma	1	4,5
	Total	22	100
Marital status of the respondent	Married)	22	100
Level of education of the respondent	without level	2	9,1
	literacy	2	9,1
	Incomplete primary	4	18,2
	Koranic school	10	45,5
	CFEPD	4	18,2
	Total	22	100
Means of transport used	Bike	6	27,3
	Motorbike	16	72,7
	Total	22	100
the types of checks carried out	Physical	13	59,1
	To taste	8	36,4
	mooring	1	4,5
	Total	22	100
consumers			
Sex of the respondent	Masculin	113	89,7
	Féminin	13	10,3
	Total	126	100
Age range of the respondent	19-30	30	23,8
	31-42	71	56
	43-54	24	19
	55-66	1	5,6
	Total	126	100
Ethnicity of the respondent	Banbara	2	1,6
	Hausa	5	4
	Kourthé	3	2,4
	mossi	2	1,6
	Fulani	45	35,7
	sonrai	2	1,6
	Tamachek	1	0,8
	Touareg	3	2,4
	Zarma	63	50
	Total	126	100

Level of education of the respondent	without level	23	18,3
	literacy	2	1,6
	Incomplete primary	15	11,9
	Koranic school	19	15,1
	CFEPD	9	7,1
	Way	15	11,9
	Secondary	23	18,3
	University 1st year	5	4
	University 2nd year	4	3,2
	University 3rd year	5	4
	University 4th year	1	0,8
	University 5th year	5	4
	Total	126	100
Type of milk consumed	Yogurt	42	33,3
	Cheese (Nigerella)	6	4,8
	Pasteurized milk	75	59,5
	Raw milk	3	2,4
	Total	126	100
Constraints of local milk consumption	accessibility	31	24,6
	Availability	65	51,6
	High price	30	23,8
	Total	126	100

DISCUSSION

The herd of agro-pastoralists is mainly constituted of Djéli (69%), they confirm those of Vias et al in 2003. Indeed, this race can produce milk whatever the poverty of its food [1]. The number of head kept by a breeder is 15 at most, this composition is not far from the one that Vias reported in 2013 (17 ± 1.8 cattle) in the same area.

The structuring of the value chain as indicated in this work is different from that shown by the Laouali [7] studies in the Dosso, Maradi and Tahoua regions. While we have found that all the actors are interrelated, the work of Laouali [7] indicates in the area of his study (Dosso, Maradi, Tahoua) that all the actors are independent and only the markets put them in relation.

At the level of the first link in the milk value chain of the Niamey dairy basin, livestock producers 'salespeople are set up by the breeders' associations through the BABs in the collection centers and CDABs in the villages. These BABs and CDABs are respectively managed by a COGES set up by the association and a village COGES set up by the villagers. The latter is chaired by the VPA, chosen for its capacity in zootechnical services. He is also the Village Animal Health Advisor. At more than 70%, inputs are for the benefit of cooperative members before benefiting non-members. Despite the support provided by the MFIs, this link has difficulties in covering milk production during all periods.

Vias [1] demonstrates that the treatment of animals is based on traditional medicines, the present result demonstrates an evolution of the animal health service. Indeed, it is the SVPP, VPAs and STDEs that work closely together to cover more than 60% of the animal health needs. Some shares, the same result was observed by Mathilde [8] in Senegal While Vias [1] demonstrates that the treatment of animals is based on traditional medicines.

The producers mostly Fulani, are unfortunately not educated to more than 90% and almost all marry. This state of affairs has also been reported by Marichatou and collaborator [9] indicating in their work "synthesis of dairy sectors in Niger" that breeders are mainly Fulani (89%). Mostly male and relatively young, dairy farmers keep a number of cows they are able to feed. The dairy herds are kept at home and the rest sent to the pastoral areas for transhumance, which was signed by Faye by showing that the number of cows a breeder can keep on the spot is therefore function of his ability to feed them at the trough. 15 cows are kept according to our results, this number waits 36 according to Mian [10] in Chad. Dairy animals must be supplemented because being fed, they produce according to Diao [11] double their production. Maty [12] demonstrates that the absence of complementation has a negative impact on milk production. Average milk production around the area is seasonal [1].

Cows produce on average 1. 84 liters / cow / day in low production period (March to August) against 2.10 liters in high production (September to October) which is not different from the result (1.9 liter / cow / day) of Bonfoh in Mali and those of Morin in the same country and the same year (2litres / cow / day). According to Hamida [13] and Schneider [14], this seasonality of milk is observed in the majority of Sahelian countries.

Once produced, the milk is collected by the collectors and directed either to the collection centers or to the dairies. Thanks to the development of these, this activity knows it's most important moment Marie. This collection is provided 100% by men except in a few rare cases where women close to collection centers or dairies bring their own milk or that of their parent. This result is different from that reported by Mian [10] in Chad where the collectors are women. According to the same author, the setting up of a collection network made it possible to mobilize a large quantity of milk. The latter is sold either to collection centers that cool and sell it to dairies or dairies directly. Only the surplus is transformed by the centers. At the producer level, the price per liter varies according to the distance and the state of the road network. It is standard within the same collection center and the highest is observed at the Say collection center (350 F). This price difference does not feel at the producer level. The majority of milk collected is marketed in the city of Niamey. Vias [1] also demonstrated it. Dairies sometimes experience periods of technical breakdown. This situation combined with the need of the growing population, pushed the collection centers to transform the milk. This is similar to what Diao showed in the peri-urban area of Kolda in Senegal on the mostly traditional transformation system. Raw or processed milk is consumed by all ethnicities, ages and educational levels. Contrary to what Mian [10] showed in Chad on the preference for sour milk, our results and those of Diao state that pasteurized milk is more preferred and consumed in urban and peri-urban areas of Niamey. The cheese (Nigerella) is for the wealthiest social class. The urban district of Niamey is the main outlet for milk production in the basin, Duteurtre (2013), the dairies and consumers in Niamey are the main markets for raw milk and milk by-products.

CONCLUSION

This study made it possible to understand the functioning of the milk value chain in the Niamey dairy basin. They also guided us to identify the links and characterize the actors by each of them, to see how each link is organized and how are they related to each other. The study finally found some constraints that hinder the smooth running of the chain; following which the following recommendations were developed:

- Conducted group orders for BABs and stock livestock feeds to alleviate feeding and milk production difficulties during periods of low production;
- Sensitize agro-pastoralists about the danger of using veterinary products from street markets;
- Make grouped credit requests for the same collection center, that is to say, take into account the need of each actor and send a single request.

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