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Local Governance of a Dairy Sector in Benin Republic: Actors, Roles, Power Relationships and Perception of Interdependency

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Authors' contributions

This work was carried out in collaboration between all authors. Author FO designed the study, collected data, performed data analysis and wrote the first draft of the manuscript. Authors SKC, NFF, IM and JH contributed to data analysis and manuscript writing. All authors managed the literature searches, read and approved the final manuscript.

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ABSTRACT

This study is an organizational analysis of the dairy sector in Benin republic. It focuses on the actors, their roles and relationships in order to reveal areas of conflicts and identify areas of interdependency to strengthen for a more competitive and inclusive dairy sector. The study used the case study approach along the segments of the dairy sector. Data were collected from July 2013 to April 2014 in two municipalities of Benin Nikki (North) and Dassa (Centre). Data were collected during group discussions (13) and individual interviews (67) using questionnaire. We found that actors of the dairy sector knew each other but the roles and the context of operation of each actor were poorly known to actors of other segments. The Dairy Unit built to modernize and improve (sanitary) milk processing set institutional arrangements that hardly fit in the socio-cultural

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prescriptions that govern the local milk transactions. Walagashi collectors/vendors recently emerged (20 years ago) and link directly the processors to the consumers. They shorten the market channels and reduce transaction costs. The study concludes that actors of the dairy sector need more dialogue and information flow to strengthen synergy and interdependency. Any attempt of modernization of milk processing and formalization of relationships between actors should take into account local governance system in place.

Keywords: Dairy sector; actors; roles; perception of interdependency; Benin Republic; West Africa.

1. INTRODUCTION

Benin republic, as many other Sub-Saharan African countries extracts most of their resources from Agriculture. About 32% of the GDP come from agriculture which employs about 70% of the active population [1]. Agriculture hence has the attention of the Benin Government and development partners. For the next 5 years (2017-2021) the Benin government gives priority to nine agricultural sectors among which the dairy sector [2]. In fact the dairy sector is an important source of revenue and contributes to food and nutrition security across the country. For example, 50% of the revenue of Fulani (who devote their life to cattle farming) are extracted from dairy [3]. Walagashi, one of the major by-products is well appreciated and largely consumed all across the country and internationally. It replaces eggs, meat and fish [4,5,6] and proves to be more nutritious than these [7,8].

In Benin cattle production was estimated at 2 058 000 in 2011 of which 65% were milk-cows generating about 40 million USD from milk per year [9]. Most of cattle production is concentrated in North Benin (85%) followed by Central Benin (7%). Traditionally known as the main activity of the Fulani [10], the dairy sector also attracts many other actors coming from various cultural backgrounds. Despite an increase of 3.6% per annum [11], the local cattle production covers only 20% of the local milk demands [2]. This results in a massive import of cow milk and by-products estimated at about 40 million USD in 2003 [12].

Cow farming in Benin is by large extensive and dominated by landrace. The well adapted “*Borgou*” landrace but sensitive to trypanosomiasis is concentrated in North Benin. *Borgou* produces on average 2.5-4 liters of milk a day [2]. Therefore efforts to develop the dairy sector are often geared toward breeding or the introduction of highly productive cows, and improved feeding to boost milk productivity.

Promising results have been obtained and consequently milk processing into by-products and the promotion of cow meat received significant attention through the project PAFILAV (*Projet d’Appui aux Filières Lait et Viande*). While promoting technical aspects of production, the actual organization of the dairy sector receives less attention. The actors of the sector are known but little is known about the local governance of the dairy sector which is by large informal. This study therefore analyzes the organization and the governance of the dairy sector with emphasis on the roles of the actors and their interdependency.

2. ANALYTICAL FRAMEWORK

The systematic study of vertically integrated agents and activities traces its origins in Coase’s analysis of the firm [13]. He highlights how firms and markets substitute each other in governing the transactions between two different stages of a production process, according to the relative cost of procuring a given input. Williamson (1971) furthered Coase’s work by exploring the internal organization of production processes and its relationship with the functioning of the markets. He highlighted how, on the one hand, vertical integration can be generated by market failures such as imperfect information, excessive bargaining costs or low mutual trust between contracting agents. On the other hand, reliance on (well-functioning) markets (inter-firm relationships) may be preferred whenever internal supply processes generate excessive internal bureaucracy or other organizational costs [14]. This study focusing on the power relations and the rule-setting mechanisms (governance) uses the value chain approach as an analytical framework. A value chain is best seen as a series of functions (conceptualization, production, processing, commercialization, transport, distribution, etc.) performed by a set of actors on a specific product to meet the requirements of the consumers. The value chain approach therefore combines ‘components’ and ‘functional relationships’ [15]. This simple

conception of the value chain has the advantage of quickly identifying segments (group of actors and functions) that create values but it fails to capture the interaction between actors and governance mechanisms that emerge from these interactions. This brings in the concept of interdependency of the actors of a value chain [16]. KIT et al. pointed out that, in a value chain, actors of a particular segment support and reinforce others so as to create effectiveness and competitiveness. Actors invest time, efforts and resources to develop and strengthen relationships in order to perform their specific functions and supply the appropriate product [16]. In the frame of these interactions, rules and regulations emerge and govern the transactions, hence the value chain.

By choosing the value chain approach for this study, we opt to describe the functions of each actor and the specific products that emerge from each segment and, to analyze actors' interactions with each other in order to depict mechanisms of governance. The aim of this study is therefore to analyze the mechanisms that govern transactions among actors of the dairy value chain and the extent to which these translate in transaction cost minimization and customization of relationships among actors.

3. METHODOLOGY

3.1 The Study Area

The study was conducted in the villages of Koussoukou and Nikki Centre selected from the municipality of Nikki located in the North East of Benin, and the villages of Okégogo, Otcha, Gbowèlè and Hèdouli selected from the municipality of Dassa (Central Benin). The municipality of Nikki was selected to represent the major zone of cattle farming of Benin [9]. Animal diversity is higher in that region and dairy activities are better developed. Fulani, the major ethnic group involved in cattle farming and in milk processing are also largely represented in this area. Beside Nikki Centre hosts the only semi industrial Dairy Unit (DU) of the municipality. Founded in 2010, the functioning of the DU has been halted shortly in 2012. It was again functional by the time of data collection.

In Dassa, because of sensibility to trypanosomiasis, only N'Dama landrace is grown there. This limits the development of the dairy sector in Dassa as milk production by N'Dama is low. We chose this area to see

whether some local institutions and dynamics emerged specifically in this context of limited milk supply.

3.2 Data Collection and Analysis

Data collection took place from July 2013 to April 2014 and was organized in three field visits. The study used the case study approach along the segments of the dairy sector. Data were collected using group discussions and also individual interviews. We organized in total 13 group discussions with cattle growers, milk collectors, milk traders, milk processors into walagashi, workers of the Dairy Unit, retailers of the DU, walagashi collectors and vendors, and restaurants keepers. Each group discussion assembled on average eight participants and last approximately 50 minutes each. The discussions were organized around topics such as group formation and management, group activities and motivation to keep the group functional, description of group's activities, perceptions on the roles played by each actor of the dairy sector and suggestions for improvement. The individual interviews involved about 67 participants, mostly women and helped us to further discuss the strategies of stabilization of the relationship between actors namely milk suppliers and milk vendors, milk processors and walagashi collectors/vendors and restaurants keepers. Individual interviews also helped to gather information on the relationship each individual of a specific segment develops with others from another segment to sustain his or her business, this includes risk mitigation strategies.

The collected data were organized in Excel and analyzed using descriptive statistics and tables. We used a double entry table to report on the analysis of perception of each group of actors about the roles other actors play. Stories and narratives were analyzed using categories.

4. RESULTS AND DISCUSSION

4.1 Cattle Farming and Milk Supply

We found that this segment is composed of pastoralists (transhumant), agro-pastoralists and peri-urban pastoralists as also reported by Sama et al. in Niger [17]. They were exclusively from the Fulani ethnic group. In fact in rural Benin, Fulani lives and livelihoods are intimately linked to their cattle where they draw most of their resources. Their major functions in the dairy sector were to feed the cows and to supply milk.

The veterinary services, zoo-technicians and input suppliers (all actors of a segment normally above the segment of cattle farmers) stepped in from time to time to vaccinate and check on animal health and supply nutritional supplements. Our informants said from the age of ten, boys when they are not attending school are associated to take care of the animals. From the age of 50-55 a herdsman can retire from his job and handover to his senior sons. Herdsmen grouped in associations to better defend their interests.

Interactions among Fulani families are strong especially on cultural activities. Fulani's interactions on economic activities are limited [10] and recent if they exist. In the dry season cattle traveled far distances to get feed: 300 km and 100 km radius on average in Nikki and Dassa respectively.

Milk is the only produce offered every day by the herdsmen to the dairy sector. Our informants said milk is the property of Fulani wives. Up to the third of the milk is consumed by the household. The remainder is sold and money made from milk sale is entirely managed by women to cope with daily expenses of the households (soap, salt, condiments etc.). On average each wife of the studied households in Nikki and Koussoukou sold three and four liters of milk per day during the dry and the raining seasons respectively. This confers a financial autonomy to Fulani wives. Bierschenk and Forster reported on similar finding from another case study in Benin. Dillmann and Ijumba and Sama et al. also reported on the similar finding from Uganda and Niger respectively [18,17]. This places women as the main actors of the dairy sector. The widely spread belief among the Fulani that milk that goes to market should not return home [4] somehow constrained women to supply milk from home.

4.2 Milk Collection and Milk Sales at Village Level

We found the sale of fresh milk in both regions (Nikki and Dassa) but it was at a larger scale in Nikki. In both areas, fresh milk is sold by Fulani wives and on an individual basis. Sale started from about 08.00 am or whenever the milk is carried home and ended around 3.00 pm. The individual milk vendors, often recently married ladies or young girls selling for their mothers, walk around the village to sell milk. This strategy is the result of the agricultural markets

imperfections. It makes it possible to meet buyers directly and randomly but it increases transaction costs. However, given the low opportunity cost of the working time of these women, this does not have a very significant effect on the price paid by the consumer. One liter of fresh milk was sold at about 300 FCFA (0.75 USD) and 400 FCFA (1 USD) in Nikki and Dassa respectively. An extra margin of 6 cents can be obtained when sold using the local unit.

4.3 Governance of the Sale of Fresh Milk at Village Level

The functioning of Wetti women group in Nikki Centre illustrates this case. Wetti is a group of 35 women created in 2003 and specialized in milk collection and sale. Early in the morning all group members would scoot the area following the path of the cattle to collect milk from their husbands or from relatives living in the areas where the cows are occasionally grouped. The collected milk is managed on an individual basis. The motivation to act as a group, women said, was to keep control over the price of milk and to prevent conflict as each of them knew the suppliers of other group members.

Milk vendors said the regularity of milk supply, adherence to the agreed price and measuring equipment, and possibilities to accept from time to time a delayed payment contributed to stabilize the relationship between milk collectors and suppliers. Once linked by a supply contract, the wives of the herdsmen were no longer allowed to sell their milk to any other person.

Any cheating act was discussed within the group and led to group sanctions imposed on the suppliers. The common sanction was to ban the guilty supplier from milk supplying to any of the 35 group members. Falsification such as mixing milk of the previous day with fresh milk is the major offense that weakens the commercial relationship, milk vendors said. Any other issues were friendly resolved.

Failing to visit her milk supplier without notice was the major offense milk suppliers pointed out. When it happens the milk must be reserved to the vendor. The following day or two days later the vendor will still be forced to buy and use it for *fura*, a local dish (porridge) made of millet/sorghum and curdled milk. In general, in situation of poor sale of fresh milk, the remainder is sold half price to "*fura*" producers. These terms

of the contract were all oral and well known to actors of these two segments. Similar regulations were reported by other informants during focus group discussions and individual interviews meaning that these are general practices in the study areas. Informants said the fear of bad reputation and social exclusion maintain adherence to the above listed regulations. These findings show that maintaining good relationship among actors is an asset (social capital) milk suppliers and collectors cherished and preserved.

4.4 Milk Collection and Milk Sales at the Dairy Unit

The Dairy Unit (Nikki Centre) stimulated in 2012 the formation of a group of milk collectors. These were averagely literate sons of herdsmen selected based on their ability to operate a quick test of quality. The DU built eight stations of milk collection. In the arrangements, Fulani wives should bring their milk to the stations. Before collecting milk from the Fulani wives, the DU collectors carried a quick test to assert whether the milk has been diluted and examine the hygienic conditions.

The Dairy Unit, Fulani wives and the herdsmen agreed on 300 FCFA (0.75 USD) per liter of milk all through the year. The collectors were rewarded with 25 FCFA (6.2 cents USD) per liter of good quality milk. Their job started as earlier as possible and ends around noon (1.00 pm) to keep the milk fresh. The DU was not responsible for spoiled or poor quality milk. The collectors bear this risk which was estimated in 2012-2013 at about 25% of total milk brought to the DU. The Dairy Unit employed 34 collectors of whom only four had formal contracts. The collectors were able to collect on average 800 liters of milk per month.

This institutional arrangement to aggregate milk at collecting points failed in 2013. In fact the Fulani wives did not find it motivating to carry their milk to the collecting points and to sell it at the same price as in their compound. The Dairy Unit, in fact, failed to incorporate the transport cost into the milk price. This indicates that any value created in a value chain needs to be rewarded. Informants further explained in focus group discussions that milk demands from the Dairy Unit was not as regular as the demands from local milk collectors with whom they already have contract.

The Dairy Unit processed the collected milk into pasteurized milk, yoghurt, butter, oil and walagashi (Table 1) and sold them through a network of six retailers who already hold shops in the area. The Dairy Unit also contracted with individual vendors who roam around the area. They were all rewarded with 20% of the sale.

The pasteurized milk can be conserved four days against one for fresh milk. This added value to the fresh milk was rewarded with 1 USD, hence pasteurized milk cost double fresh milk. We did not analyse the costs of milk processing at the DU because we did not have access to the statistics of the DU. Our focus group discussion with workers of the DU however indicated that pasteurized milk was not well demanded in the area (Table 1). According to the managers of the Dairy Unit the consumers culturally preferred fresh milk. Our investigation with the consumers however revealed that the limited local demands for pasteurized milk is due to the large price difference. The Dairy Unit should consider reducing their operation cost to build sustainability.

Table 1. By-products of the dairy unit of Nikki

By products of the DU	Sale price (USD)	Profitability (as perceived by the DU)	Perishability	Optimum duration of conservation (days)	Demand from consumers
Milk (1000 ml)	1.75	++++	+++++	4	++
Yoghurt (125 ml)	0.63	+++++	+++++	10	+++++
Butter (125 ml)	1.25	+++	+++	21	++++
Oil (1000 ml)	5	++	+	1825	++++
Walagashi (1000 g)	5	+	+++++	10	+

Source: Survey, July 2013

+ indicates the importance of the criteria. ++ is stronger than +

4.5 Milk Processing into by-products

4.5.1 Milk processing into yoghurt, oil and butter

Butter and 'cow oil' were produced regularly by the Dairy Unit and only occasionally by the local processors for household consumption. Yoghurt was produced exclusively by the DU. Yoghurt, butter and oil were the best sold by-products of the DU (Table 1).

The local processors did not know how to produce yoghurt. The actors of the dairy sector therefore need to be technically strengthened. Considering the limited human resources available for training at the Agricultural Departments of the Ministry of Agriculture, ITCs such as videos could be best used to train milk processors. Video use in farmers training has proved to be effective and powerful training tools [19,20,21]. Beside videos related to milk processing are available at www.accessagriculture.org. The 3gp formats are also available for viewing on mobile phones. The fast penetration of mobile phone in rural Africa [22,23] will sustain such unsupervised learning [24].

4.5.2 Milk processing into walagashi

We found milk processing into walagashi at the Dairy Unit and with local milk processors.

At the DU walagashi were less produced as it was less demanded (Table 1). The Interviewed local processors in Nikki proudly said the DU cannot compete with them just because they are born into walagashi production. Interviewed consumers also attested that the traditionally processed walagashi tasted better. Further study to compare the characteristics of walagashi produced by these two categories of actors may be a useful investment. We deduct from this finding that for a competitive value chain, actors need to specialize into activities in which they are skillful.

4.6 A Social Organization of Milk Processing into Walagashi at Village Level

4.6.1 Gendered milk processing and value addition

Milk processing into walagashi was women business in the study area. This derived from the

cultural fact that milk is women's property. With a traditional protocol in use in the areas [12,6], six walagashi of approximately 250 grams each were obtained from five liters of milk. This is similar to yield reported by Bassabi from Djougou and Wassa Pehunco (North West Benin). Walagashi, in optimum conditions can be conserved for 15 to 21 days. Similar conservation period was reported also by Bassabi (2011). Each walagashi of 250 grams was sold at about 400 FCFA (1USD) at the local market. The value added to five liters of fresh milk (including processing costs) in order to reduce perishability was therefore rewarded with 400 FCFA (1 USD). Walagashi production was thus not financially worthy. This agrees with Saroumi [see 25]. The studied processors unanimously said they would stop producing walagashi if they find competitive and reliable outlets for fresh milk. We conclude that for Fulani women, milk processing into walagashi was more a strategy of milk conservation than a proper business.

4.6.2 Organization and motives of collective walagashi production

A collective production of walagashi was observed only in Okégogo and Otcha (Dassa). On a regular basis (daily or weekly), processors brought together their milk for walagashi production. The sale of the produced walagashi was left to one or several designated members. Money equivalent to the submitted milk is returned to each member and the benefit kept in the group's account. Group money is used only during weddings and naming ceremonies or in situation of misfortune (sickness, funerals, etc.).

Informants cited several reasons that motivated group production of walagashi in Dassa. Women said they were searching for institutions that reinforce cohesion, increase production and best defend their interests at the walagashi market. In fact the local processors felt that the price of walagashi is imposed on them by the walagashi collectors. They believed being in group increase their bargaining power.

4.7 Collection and Sales of Walagashi

4.7.1 Emergence of walagashi collectors

In general women and girls were responsible for the sale of walagashi. The sale often took place along the main roads leading to the main cities or at major market places. In Nikki, the sale of

walagashi was the responsibility of processors' daughters unlike in Dassa where girls helped only when they were available. In fact, school attendance seemed higher among Fulani girls in Dassa than Nikki. This may explain why we observed more walagashi collectors in Dassa. Women said to provide appropriate care to their family and to avoid disrupting the schooling of their girls, they sold their walagashi to the collectors who sold them at market places. Sagbo (2011) described a longer marketing channel in Djougou (North West Benin), distinguished collectors from vendors and found that vendors rarely bought directly walagashi from the processors [see 26]. The short marketing channel revealed by this study should be encouraged as such short channels reduce transaction costs.

According to our informants in Dassa, walagashi collectors emerged and remarkably increased in number around 2000. On average a collector bought per day 40 *walagashi* of about 250 grams during the dry season and 160 pieces per day during the rainy season. Collectors bought *walagashi* at about 350 FCFA (0.9USD).

Contrary to milk sale and milk processing into walagashi held exclusively by Fulani wives (monopoly), we met walagashi collectors from various ethnic groups such as Fulani, Idaatcha, Yoruba, Mahi and Fon. This diversity is an indicator of the perceived opportunities of business.

4.7.2 Selection of walagashi collectors and relationship with walagashi processors

The selection of a collector was mainly based on the ability of the collector to pay cash. In general, a delay of 24 hours is acceptable. Our interviewees said previously established social relationships are important but play less in this selection as the financial capacity of the collector really matters.

The contract of walagashi collection was oral. The processors commit to follow a consensual (oral) protocol that set the size/weight and various steps of walagashi production. This protocol recommends water content, forbids frequent practices such as the use of the milk of previous days and the incorporation of old walagashi into new ones. These are practices frequently observed that increase perishability of walagashi [27,6]. The walagashi producers also

commit to sell exclusively to the recruited collectors. The walagashi collectors in turn commit to a regular walagashi collection and payment with minimum delay. In case of sickness the collector should find a replacement.

Surprisingly social capital (friendship and kinship resulting in goodwill: sympathy, trust, and forgiveness offered by friends and acquaintances) known to play in such contractual arrangements [28,29,30,31] did not appear as determinant elements that stabilize the relationships between the processors and the collectors. To the processors what keeps them as business partners with the collectors is their ability to pay the purchased walagashi without delay. This is understandable as money generated by milk and by-products was directly used for the immediate needs of the household.

Cheating by a processor as we witnessed during our fieldwork resulted in an exclusion from the list of walagashi suppliers. The faulty processor will therefore sell herself her walagashi. This is a time-consuming activity all walagashi processors tried to avoid when a good price can be obtained at home. So the walagashi processors are less likely to sell to the market if the shadow value of their time is higher [32].

From the other side, the processors can collegially decide to sack a collector when she fails to show her good will to pay processors within a period of 24 to 48 hours. We did not witness such situations during our fieldwork.

4.7.3 Value addition by walagashi collectors

The collectors further processed walagashi to improve storability and conservation before carrying them to local markets (Atchérigbé, Paouignan, Hounkpogon, Bohicon, Glazoué etc). Value addition at this level consists of pasteurizing the collected walagashi. Sometimes the bark of sorghum is boiled together with the walagashi to give it a reddish colour [see 26,6]. During the boiling process, the collectors reshaped the walagashi or merged several small walagashi into big ones. According to Sagbo (2011) the added value by this category of actors is rewarded by 64% of the total value created on walagashi; processors and restaurants having 15% and 21% respectively. This agrees with the view of the interviewed walagashi processors that the collectors/vendors were making the largest margin.

4.7.4 Admission and sanctions with the group of walagashi collectors

The walagashi collectors were not organized in formally registered association but the oldest collector was designated as the Chairperson. Elisabeth, 65 years old, has been, for more than 20 years, collecting walagashi, re-processing them and selling them along the main streets of Dassa and at Dassa junction. Her nickname "Maman Kékéré" "little mother" by her fellow, shows the nature of the relationship among them. She is described as a lovely woman but very firm and strong to protect her business and keep under her control the more than 50 walagashi vendors of Dassa junction. Maman Kékéré had the sole responsibility of recruiting new members. She issued admission only after the approval of other collectors. Any opposition would stop the admission process. It is important to note that the admission procedures reported to us varied largely in content.

An unspoken rule reported by informants was that candidacy should be mentored by a senior walagashi collector/vendor. Our informants said the short cut to get admission was to work three to five years for a senior collector as a sale person. These findings portray the hierarchical relationships established within the group of walagashi collectors. The major offense reported was walagashi collection from a non-assigned village. Such cases were reported to Maman Kékéré. In case of recidivate, the warned collector is excluded for the walagashi business and any other social activities and gatherings that involve fellow walagashi vendors. The fear of a social exclusion (penalty) appears as the mechanism that re-enforces adherence to the regulation.

4.8 Restaurant Keepers and Individual Consumers of Walagashi

At the far end of the dairy value chain are the consumers. They buy milk and walagashi from the collectors/vendors or via the restaurant keepers. The restaurant keepers bought walagashi 7 cents USD cheaper than ordinary walagashi consumers. Any regular individual consumers also got the same discount. The discount is offered to secure relationships. We did not follow the commercialization of walagashi by the collectors outside the municipalities. Our informants said however that the margin is much higher.

In Dassa most of the restaurant keepers bought walagashi on loan, Fumke and Elisabeth mentioned. They pay back every Sunday. To keep the relation going the collectors needed to be patient as in case of poor sale, the restaurants also delayed payment. In any case the collectors/vendors were in weak position as they fear perishability of the walagashi. They were hence flexible and opened to all sort of arrangements.

In the restaurant walagashi is presented in the menu in slices. A walagashi of 250g is sliced into 9 to 12 pieces sold at 25 cents USD each. Value addition at this segment of the value chain consists of culinary processes. The tastier the menu, higher is the chance of making profit. This segment of the value chain takes the second large share of the added value [26].

4.9 Analysis of Perception

Table 2 summarises perceptions of each group of actors of the dairy sector about the roles other actors play.

We did not include agro input dealers and veterinary services into Table 2 because their interactions were limited to the herdsmen. Each group of actors operating at specific segments of the dairy sector knew about the existence of other actors even though they did not have complete view about the role they each play. This may be explained by the fact that the sector is not formally organized hence actors build on their social capital to make livelihood. They interacted only with actors that are central to their business. This is the case for the retailers who acknowledged the existence of other actors but since they worked only with the DU, they knew only the roles of the DU.

The operation cost of the DU translated into high price of by-products. To reduce the price of by-products the DU set institutional arrangements for milk collection. The view expressed by the herdsmen and milk collectors (Table 2) show that the DU did not take into account the socio-cultural beliefs that govern their community. For example, by requesting herdsmen to channel milk to the collection stations, the DU breaks the cultural prescription according to which milk is women property. Herdsmen said they were embarrassed by this situation as DU contributed to the development of their activities. Fulani wives could have accepted this suggestion of the DU but they did not find the milk price of the DU competitive. Beside it is well spread within Fulani

Table 2. Perception of actors about each other roles in the dairy sector

	Herdsmen	Milk collectors/ vendors	Milk processors	Diary unit (DU)	Walagashi collectors / vendors	Retailers	Restaurants owners
Herdsmen	xxx	No direct interaction (We give milk to our wives and their manage it)	-	DU Organises vaccination campaign for our animals. Wants cheap milk which our wives opposed. DU has irregular milk demands that put us at risk. They could reject our milk. This is a cultural offense	-	-	-
Milk collectors/vendors	-	xxx	We supply them with milk (surplus)	We supply them with milk. Offered milk price is not competitive.	-	-	-
Milk processors	They give us milk	We buy milk from them (mostly in	xxx	Compete with us on milk collection	Business partners: Take on them the risk of perishability of walagashi.	-	Buy walagashi

	Herdsmen	Milk collectors/ vendors	Milk processors	Diary unit (DU)	Walagashi collectors / vendors	Retailers	Restaurants owners
		dry season)			Do the sale leaving us time for other productive activities. Impose rules and price of walagashi. Have a large share of the benefit		
Dairy Unit of Nikki	They fail to supply DU with milk.	Supply us with milk	Compete us in milk collection and walagashi production	xxx	-	They meet only 50% of contractual obligations.	Buy by-products
Walagashi collectors/vendors	-	-	Take no risk. Need to be more flexible in case of poor sale	-	xxx	-	Buy walagashi. They make the largest margin
Retailers of the Dairy unit (DU) of Nikki	-	-	-	By-products highly perishable. Irregular supply of by-products.	-	xxx	-

	Herdsmen	Milk collectors/ vendors	Milk processors	Diary unit (DU)	Walagashi collectors / vendors	Retailers	Restaurants owners
				DU contracts ambulant individual sellers who compete selling the same by-products at the same price.			
Restaurants keepers (Dassa)	They need to take care of their cattle to increase production	-	Their walagashi is too soft.	-	Re-process the walagashi to give it the right texture and reduce perishability. Keen and flexible to develop and maintain commercial relationships	-	xxx

-: no direct interaction. Actors listed in the first column expressed views on actors listed in the first line

communities that milk that goes out to the market cannot come back home [4]. Women were therefore reluctant to bring milk to the collection stations especially as their milk can be rejected because of quality or simply because the DU has reached expected daily milk. These areas of conflict grounded in socio-cultural values could be improved by regular dialogue and information sharing among actors of the value chain.

The DU contracted the retailers to strengthen their partnership. The retailers likely to save electric power did not operate their fridge all the day. In fact, retailers sold on average 25 yoghurts of 125 ml per day against 50 as indicated in their contract. The DU consequently rejected any damage caused to the products before the expiry date. The retailers to improve their sale recommended the suppression of individual vendors who roam around with the same by-products at the same price. The conflict between the retailers, the ambulant vendors and the DU raises again the issue of dialogue and information flow among actors of the dairy sector.

The DU saw the local processors as competitors in walagashi production as consumers preferred the local walagashi. In fact, the Dairy Unit managers acknowledged that their walagashi get spoiled very quickly. The Dairy Unit is planning to partner with local processors to improve the quality of their walagashi. Such initiatives that build capacity and complementarity among actors are needed to strengthen the dairy sector. The Dairy Unit could also specialize in by-products that are appreciated by their clients.

Local processors and collectors of walagashi showed the strongest relationship and interdependency. Local processors found that the activities of the walagashi collectors helped them to create slots to devote to other revenues generating activities and also to take care of their kids attaining school. The processors also acknowledged that the collectors bear the risk of perishability of the walagashi. They however perceived that the collectors exploited them. Our findings suggest that for a viable dairy sector the capability of the collectors needs to be enlarged. Microfinance services would play important roles in this. Walagashi collectors also need to be trained and technically equipped to improve walagashi conservation. The DU would then focus on less perishable by-products like butter and cow's oil.

Friendship and kinship that give rise to trust and forgiveness in social relationships played little

role in the market relationships among milk collectors, walagashi processors and collectors. This opposes the commonly shared view that social capital favours business arrangements [30,31,33]. We conclude that when livelihood is at risk, social capital play less in transactions.

The dominant characteristics of the dairy value chain as revealed by this study namely the interconnection of actors, the limited room for bargaining as shown at various segments (milk provision, walagashi collection and sale), the existence of a variety of control instruments (including reward and penalty systems) rooted in the socio-cultural contexts, the existence of conflict resolution mechanisms, show that the dairy value chain works more like a 'firm' than a market [13,14]. However there seemed to be an imperfect information flow among segments. The internal organization of the dairy sector obviously translated in minimalizing the transaction cost but by so doing narrowed the bargaining power of many actors. This internal organization of the dairy sector in absence of formal institutions indicates that when interdependency is strongly perceived by actors, a value chain can operate without any external intervention. This is the ultimate objective of the development of value chains in agriculture especially in developing countries.

5. CONCLUSION

The dairy sector is probably one of the most ancient on which rest food and nutritional security of Benin. This study confirms the five already known segments of the dairy value chain in Benin: milk production (cattle farming), milk collection, milk processing, walagashi collection and sale, and dairy product consumption. We found that not all the actors have a good knowledge of the roles other actors play in the value chain. These results from the fact that the relationships among actors are informal, developed based on perceived interdependency and maintained mostly as livelihood strategies.

In Dassa walagashi collectors/vendors emerged in between the walagashi processors and the consumers. These contracted with walagashi processors and supply directly consumers and restaurant keepers. The walagashi collectors strengthened the relationships with walagashi processors to secure markets. Walagashi processors in return kept the commercial relationships going because their needed time to attain more productive economic activities and domestic assignments. In the course

of their interactions processors and collectors continuously seek for agreement on price and processing protocol.

The distribution of walagashi as a commodity is regulated by a private market system. Most transactions involve small volumes (thin markets) and take place in spot markets. Due to seasonal variations in milk production and the small-scale production systems, most collectors handle relatively small quantity of walagashi. Short marketing channels were therefore developed to reduce the transaction costs. The collectors played a crucial role in shortening marketing channels to make walagashi available for the consumers, hence reduce the transaction costs. In these conditions with the lack of market information, collectors with strong social connections may have higher output. Real estimates of margin and transaction costs are lacking in this study. These are possible research areas for further investigations on the dairy sector in Benin.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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