FACTORS INFLUENCING THE MILK SECTOR IN A SAHARAN ZONE: THE CASE OF MARKETING IN THE VALLEY OF M'ZAB (ALGERIA)

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Abstract

The organization of markets and consumers' behavior can conceal the levers actuated sale to energize the entire dairy industry in Algeria. Like other Saharan regions, in Ghardaia, the creation of processing units, has generated positive farms (cattle, dairy goats and camels) with significant impacts on the local market namely an increase in milk production. The organization of raw milk collection is the weak link and the focal point for the dairy industry by restricting its optimization and its integration over dairy products marketing.

Key words: Consumption, Milk production, Milk collection, Marketing channel, Saharan zone

INTRODUCTION

The dairy sector in Algeria, defined through its four main factors, among which, the production, collection, the processing and marketing and consumption, has been demonstrated by the dynamic creation units nurseries heifers [3]. Dairy policy in Algeria based on subsidizing imported powder that induces greater levels of consumption, 115 kg milk equivalent per person per year [15], but hostile to the development of the local dairy industry.

During the last decade, Valley M'zab, like other Saharan regions, witnessed a remarkable growth in terms of milk production, and, thanks to the improvement of livestock, enhancement of the genetic potential of dairy bovine and goat as well as the increase in number. This helped develop an economic system able to occupy a prominent place in the development of Saharan zones [3]. Valley M'zab can access the status of regional dairy pond, for the many strengths and potentials that contains the region, favorable biotope for this type of farming as well as the enthusiasm of farmers for this type of activity. The latter has as motivation the existence of several units of processing and packaging, strategic lever for the development of dairy farms. Strong consumer demand for milk and dairy products, related to a growing population, is not yet satisfied locally. This slow increase is not able to ensure the needs of dairy products for a rapidly changing population, generating consumption demands increasingly growing [9]. Production in industry and dairy farms do not follow the pace of consumption [1].

The collection of raw milk is the link sensitive and focal point of the dairy industry because it induces fluctuation quantitative collection of raw milk.

It is precisely in this context, and in the light of all these elements that is grafted our main question, namely, how to think about the organization and the functioning of the local dairy to ensure the optimization of the milk collection? This is to identify the main factors that influence the levels and types of dairy products consumed, to start thinking about the potential for improvement of this sector in the region.

MATERIAL AND METHODS

Official statistics of the Wilaya of Ghardaïa were consulted to define spatially the study areas. Indeed, very few studies have been devoted recently to the consumption of milk and dairy products in the Sahara. While the dairy sector is booming Ghardaïa. It is in this context that this study was initiated. The available data are contradictory and no study has so far helped to accurately assess the state of the dairy industry.

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The basis of our study is the M'zab valley (Figure 1). Our approach is based on surveys and investigations conducted with farmers producing, of processing units, agricultural institutions and local authorities, in order to analyze and characterize the processing and the consumption of milk and dairy products as well as to assess their impact on the development of milk production. Like of any scientific research that focuses primarily on concrete observation, Our approach is to analyze the facts and to identify the necessary conclusions.

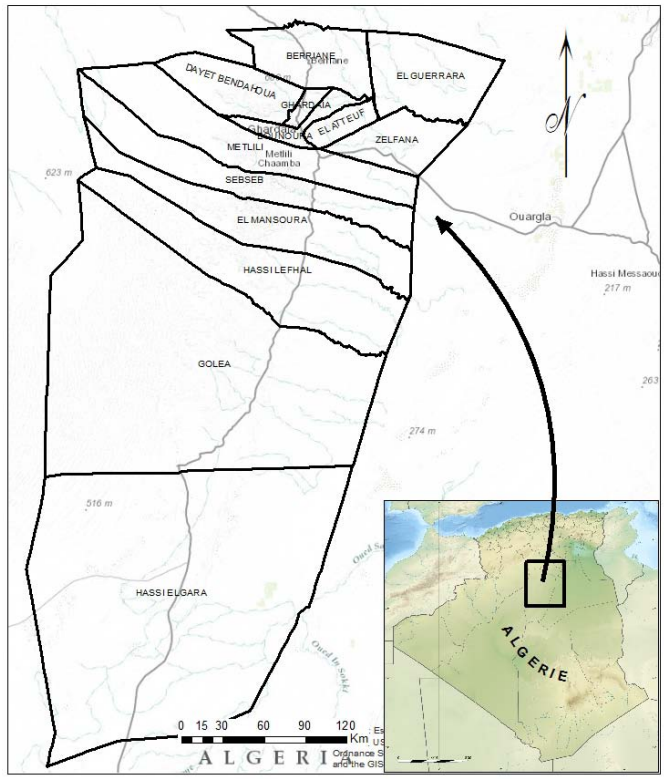

Figure 1. 7 municipalities in the study area

RESULTS AND DISCUSSIONS
MILK PRODUCTION

Table 1 Milk production per season

Operational Category	Milk production				
	Average production / C/D	Season (Average production /C/D/S)			
		Winter	Sping	Summer	Autumn
Exploitation ≤ 10 Cows	18	19	19	14	19
Exploitation [10 - 20] Cows	15	15	16	13	16
Exploitation ≥ 20 Cows	24	20	28	19	28
Average	19	18	21	15.33	21

Sourcesurvey
Production C/D = Production in liters per cow per day.
Production C/D /S = Production in liters per cow per day and per season

Milk production per cow per day and season is presented in Table 1. Milk production (C / D) is on average 19litres. For farms with more than 20 dairy cows (MC), the average production is 24 liters it is due to the creation of breeding heifers nurseries which has increased the number of tested cows [2]. In fact, the average milk production reveals the seasonal variability, which takes an average minimum value (15.33L/C/D/S) in summer, and in winter an intermediate value (18L/C/D/S) because of cold, heat and drought. The climate remains the limiting factor in milk production due to its direct influence on the forage resource availability [2]. In addition, it is necessary to take into account the poor adaptation of imported cows. So that, new generations are introduced which eventually adapt to the climate replacing the old ones. Spring and autumn leads to a rise in milk production (21L/C/D/S) thanks to warmer climates in relation with the push of grass, resulting in better forage availability. Periods of autumn and spring are those where milk production is important. It is at this level that we should make an effort in light of the timing of calving during those periods for a substantial increase in milk production, which is endowed with financial incentives both for production and for the collection (Table 2).

All breeders use the mechanical milking for the availability of trucks. Milking takes place twice a day with an interval of 12 hours on average.

Table 2 Dairy cattle and milk production bonuses and collect of the year 2011

Month	Quantity of Milk (liters)	Production bonuses (DA)	Premium collection (DA)
January	695.447	8.345.364	3.477.235
February	667.837	8.014.044	3.339.185
March	754.579	9.054.948	3.772.895
April	744.287	8.931.444	3.721.435
May	741.497	8.897.964	3.707.485
June	711.397	8.536.764	3.556.985
July	708.248	8.498.976	3.541.240
August	672.370	8.068.440	3.361.850
September	693.931	8.327.172	3.469.655
October	734.382	8.812.584	3.671.910
November	712.892	8.554.704	3.564.460
Décember	797.895	9.574.740	3.989.475
Total	8.634.762	103.617.144	43.173.810

Source, DSA, 2012

The average quantity of milk per cow per lactation average is 5475 kg / year, it can go up to 7300 kg when the conditions of feeding are optimal that is what we observe in some breeders.

Processing And Packaging Unit Of Milk

M'zab Valley is known for its production potential of dairy products. The food processing industry is represented by five (05) units of processing and packaging of milk (Table 3).Table 3 shows the amount of milk produced in different pasteurizating units of 2012.

Table 3 Packaging of milk at pasteurization units (Kg)

Month	SAFI LAIT	ETS KHOBZI	SARL CHIHIA	SNC WAHA	MILKINA
January	376.339	143.284	114.766	61.058	/
February	345.162	117.622	150.021	55.032	/
March	405.645	128.953	165.917	58.905	/
April	413.108	119.448	157.672	54.059	/
May	414.949	114.982	120.902	51.683	38.981
June	380.664	118.214	132.086	32.826	47.607
July	360.425	137.586	135.580	26.170	48.487
August	351.832	118.151	136.592	17.584	48.211
September	369.065	112.831	143.373	18.473	50.189
October	402.016	106.667	155.274	17.695	52.730
November	397.483	111.063	144.254	15.587	44.505
Décember	442.359	126.766	159.602	17.710	51.458
Total	4.659.047	1.455.567	1.716.039	426.782	382.168

Source, DSA, 2012

These units are supplied with raw milk on their own means and strengthened by the contributions made by breeders and collectors. (Figure 2)

Marketing Assets And Units Of Processing And Packaging

Marketing takes place at the chief town of the province and beyond to rural areas and to other wilayas depending on demand. The latter is increased in summer.

This expanded circuit holds several advantages:

- The large number of dairy cattle breeders,
- Premiums subsidy to processing units, collectors and breeders,
- The dairy cows farms shareholders at the processing units,
- The mastery of techniques for processing milk according to scientific standards.

Milk Dispatching

Nearly 80% of raw milk produced by each farmer are delivered processing units plants in the region of Ghardaia, in addition to the transportation and distribution of products, collectors promote awareness of producers and sellers of finished products, to observe the milk hygiene measures. They also propose to the latter, delivry contracts and thus contribute to the extension of the local milk market [2].

The rest of the amount of raw milk for home consumption, and making traditional cheese (Kémaria), which is widely used and requested by the local population. There are a few breeders who prefer to sell their products themselves, either directly (milk) or after processing. Such a situation is necessarily a constraint to the implementation of a system of intensive dairy production [1].

Collections and transport of milk Collectors

In most cases, the breeder does not deliver the milk himself to industrial units. We observe that collectors are approved by the collection center, which collect milk from a business group and take it to the collection center. But in general, they are collectors, owners of refrigerated vehicles which collect milk at the farm level and route directly to the processing unit.

In our study area, there are two collectors who ensure collect milk daily even on holidays. M'zab Valley is classified as dairy basin of the Sahara region, with its great potential in milk production and collection of

67% of the quantities of raw milk produced [7]. Collection should have a key role in the policy development of national milk production and it is the main link between the production and the dairy industry [14].

The collection equipment used by both collectors is a tanker truck and a car tank. The total capacity of the first collector is 5000 L/day; they really collect only 4800 L/day with 25 farmers. The second collector, served by 12 breeders, ensures a collection of 2400 l/day in two stages (Table 4).

Table 4 Milk collectors in the valley of M'Zab and Metlili

	Manifold 1	**Manifold 2**
Collection equipment	Tanker	Tank car
Collection capacity	5000 l/Day	1700 l/Day
Volume collected/Day	4800 l/Day	2400 l/Day
Number of farmers concerned	25	12

Collection center

The dairy Valley M'zab basin is of a large cattle farms base. In our study area, there is a collection that stores the amount of milk before processing in optimal conditions of hygiene and storage (insulated tanks). The amount of raw milk collected has been a significant increase with the financial support of the State, which went from 7 dinars to 12 dinars per liter. In 2009, the collection capacity has exceeded the 13.400 liters/day [3].

Collection centers have boomed wherever they were installed. This growth is linked to the advent of the policy of agricultural and rural renewal in 2008, which led to the agricultural sector to focus its efforts on strengthening local production, especially those of consuming products [3].

Thus, the milk collection infrastructure must be improved. In this regard the organization of farmers in collection centers seems to give encouraging results [8]. Unfortunately, the collection could not grow in a sustainable and meaningful it has undergone significant variations from year to year during the period 2000 - 2007 [14].

Milk transformation

Processing capacity

The unit Safi milk is ranked among the top dairy processors that are in the valley of M'zab by its processing capacity of up to 30,000 l / d.

It includes a large number of cattle and goats breeders, and ensures the supply of the local market in milk and milk products or even other markets such as nearing wilayas Laghouat and Ouargla.

Table 5 Quantities and types of milk produced by pasteurizing units approved by Valley M'zab

Production unit	**Cow's milk**	**Goat milk**	**Camel milk**	**Reconstituted milk (Milk powder)**
SAFI LAIT	4.659.047	155.548	28.711	2.718.431
ETS KHOBZI	1.548.375	/	/	1.265100
EURL CHIHIA	1.762.970	/	/	/
SNC WAHA	316.676	74.183	/	/
MILKINA	1.214.187	/	/	/
PATURAGE DU M'ZAB*	14.539	12.754	6.217	/
Total	**8.634.762**	**308.639**	**96.339**	**4.676.431**

* Arrangement with the non-dairy ONIL Source survey

Types of final products

Safi dairy milk ensures the production of many milk products which are mainly:

- Pasteurized milk to raw milk;
- Leben in raw milk;
- Kémaria (traditional cheese);
- Butter made from cow's milk;
- Butter made from goat's milk;
- Traditional butter made from goat's milk.

These products are marketed under developed fixed and non-revisable price retailers (Table 6).

Table 6 Milk products for 2011

Unit of pasteurisation		Leben(L)	Kémaria(Kg)
SAFI LAIT		/	420.000
ETS KHOBZI		/	/
EURL CHIHIA		6.840	/
SNC WAHA		7.100	/
Total		**13.940**	**420.000**

Source, DSA, 2012

Preparation techniques of some dairy products

All dairy products, except the traditional cheese and Leben pass first through the pasteurization step by increasing the temperature of the milk at 80 ° C followed by an abrupt decrease in the temperature at 4 ° C. The traditional preparation of some dairy products deeply rooted in the habits tends to preserve a certain extent, a significant market share in traditional products [13].

Traditional cheese

Our study shows that handcrafted traditional type products such as cheese or raw milk purchased directly from farms and / or processing informal workshops occupy a residual place and may eventually disappear if the strict application of laws relating to the health safety of these products was adopted [16].

In the valley of M'zab, most consumers enjoy fresh products (fresh milk, Leben, Kémaria ...) [3]. Soft cheese, known locally Kémaria is made from raw milk mixed with vegetable rennet (artichoke extract) for 1/2 hour until its coagulation, then stirs in a ladle during 20 min. After decantation, the dough is put into molds. This product is primarily marketed by large capacity units (Table 7)

Sometimes vegetable rennet can be replaced by animal rennet curd after the kid. This is a traditional use, but tends to be more marginalized in favor of vegetable rennet.

Butter and whey (leben)

Butter and leben (traditional curd) from artisanal processing workshops, storehouses remain the most popular, especially those located in neighborhoods (Table 7).

Its design was based on the deposit of raw milk in a fermentation chamber at a temperature of 37°C until fermentation is then introduced into a churn for a few minutes [16]. The temperature should be maintained between 15 and 20 °C to ensure taking lumps of butter in whey (leben). Both products will undergo the final packaging step.

Reconstituted milk

Using milk powder which contains 26% of fatty matter and which is devoid of FM 0%, both are mixed with water at a temperature of 37 °C and homogenized. Then the mixture will undergo pasteurization and packaging.

Table 7 Products prices of the unit Safi milk

Types of products	Industrial production made / month	Factory selling price	Cost of plant (da)	Price from retailers
Kémaria	85 00 l	320,00 da/kg	2 720 000,00	380,00-400,00 da/kg
Milk lacté (leben)	150 00 l	35,00 da/l	525 000,00	40,00 da/l
Natural milk	1 800 00 l	38,00 da/l	6 840 000,00	42,00 da/l
Reconstuted milk	600 00 l	28,00 da/l	1 680 000,00	35,00 da/l
Butter made from goat milk	200 kg	750,00 da/l	150 000,00	900,00 da/l
Butter made from cow's milk	2 500 kg	360,00 da/kg	900 000,00	450,00 da/kg
Traditional butter (d'hane)	100 kg	600,00 da/kg	60 000,00	800,00 da/kg

Milk quality and hygiene equipment

Farms, often inserted into the urban fabric, sometimes pose problems of sanitation and hygiene for products marketed [9]. To avoid any source of product contamination, hygiene standards are applied by staff dairies (holding labor disinfection of hands before handling ... etc..). These health problems become more troublesome during the summer when the rise in temperature greatly influences milk storing [2]. In some cases, lack of refrigeration on the farm affects the quality of milk during the days when the temperature is relatively high. The quality of milk is affected by the processing conditions [8].

Analyzes in dairies

Raw milk does not keep long and can be the source of zoonoses, all this complicated logistical difficulties to overcome to connect producers to processing units [14]. Samples of milk and its derivatives are performed regularly. The samples are sent to the Regional Veterinary Laboratory Laghouat for bacteriological analysis. Results are negative right now. Each dairy is equipped with a laboratory physico-chemical analysis that performs multiple types of analysis (density, acidity and rate of FM). However, it does not perform microbiological analyzes. According to Carole (2002), milk contains on average between 35 and 45g/L of fatty matter, but more often in the processing unit, there are fatty matter levels relatively low (25et 30g/L) this is due to the quality of the food served at the farm level. Dairy products commonly consumed by the inhabitants of the valley M'zab are now mostly from industrial processes are in the eyes of consumers guarantees undeniable quality control (including hygienic safety) which can not rely on the traditional processing [16]. Overall, it appears that consumers are more satisfied with the accessibility, health quality, taste and packaging of dairy products.

Marketing of dairy products

Livestock farming in the South is not a market-oriented activity. It is also a food bank, social security, a form of hoarding, social recognition and a credit card! [9]. The milk processing unit was the "cornerstone" in the construction of new dairy sector [12].

Breedeers producers commercialize some of the milk to the dairy via collection centers 30DA/litre and goat milk to 32 AD / liter collectors, the price will be changed after processing according to the type of product. It should be noted that goat's milk and its derivatives are more expensive than cow's milk.

The dairy transforms the raw milk dairy in packaged milk and derivatives, which are then distributed to consumers through various channels (retail, retailers) [11]; this market has no geographical limitation and may overflow beyond administrative boundaries and is based on the resources used.

In the framework of incentives incurred by the State, the dairy industry receives under the grant amounts that are based on the stage production.

Table 8 State subsidy to the dairy industry

Actors in the dairy sector	Premium subsidy /liter
Producer	7 DA
Manifold	4 DA
Transformation	1 DA
Total	**12 DA**

Milk producers also benefited from state support in this context, for the acquisition of machinery and equipment for breeding, milk storage (trough, cooling tank and trolley milking heifers purchased ... etc.).

Consumption and consumer choice

Milk and dairy products to consumers remain healthy products, good, authentic and relatively safe [4]. At our level, most consumers enjoy fresh products (fresh milk, Leben, Kémaria ...). In fact, the situation is much more critical for classes with limited incomes in which the consumption of dairy products remains inadequate both quantitatively and qualitatively) [16].

Among the assets of the dairy industry, there is local know-how inherited from many generations of tradition cheese (Kémaria). The latter has been enriched over the years by advances in technology, but consumers

remain attached to the local product. Despite its price, milk powder has many advantages especially through its availability in time and accessibility [13]. Thus, it competes the local milk production gaining a larger market share in the dry season, a period of decline in the supply of local milk in urban markets [6].

In this context, it seems useful to better understand the dynamics of urban consumption of dairy products in order to identify market supply levers products from local milk [10].

Distribution of milk and dairy products

The creation of a network of dairy and structuring circuit manifolds have boosted milk supply circuits Valley M'zab. The main objective through the different types of milk marketing channels is to regulate the milk market to meet this problem and to ensure the smooth operation between the various links in the chain (Figure 2).

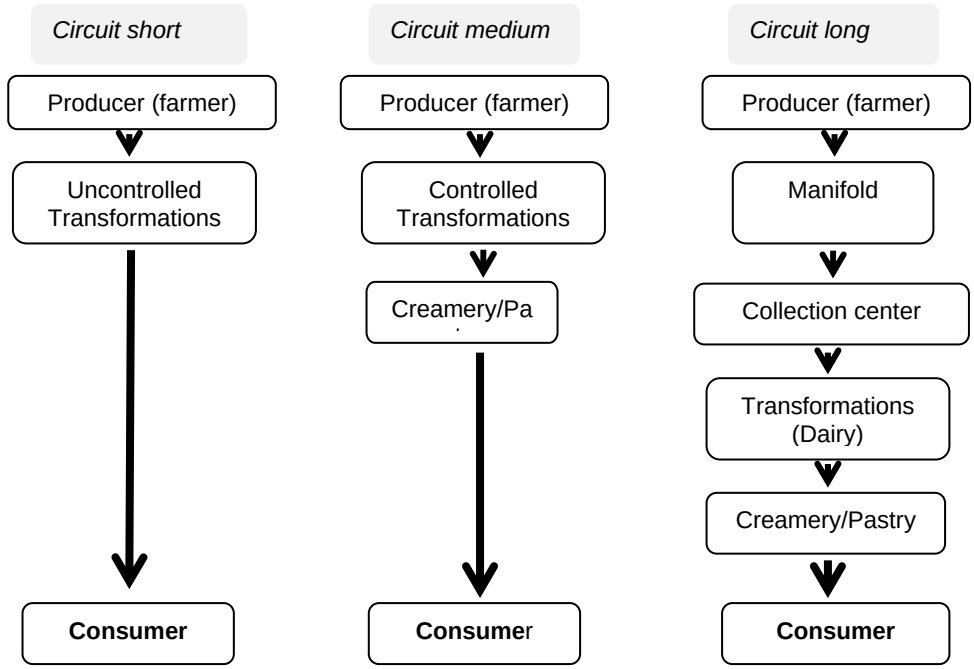

Figure 2 Major milk marketing channels in the region of Ghardaïa [3]

Before it is in the hands of consumers, milk is experiencing some routing through three main channels which are summarized in:

Short circuit: This is the case of farmers who keep a quantity of milk in a non-official, to sell directly or after conversion to traditional cheese whey (Lben) in the house or in the operation of livestock and thereby ensure added value.

These peddlers commercialize milk whose quality is often questionable and pose the problem of competition with the organized sector [2].

Circuit means: This case concerns the farmers who do not deliver their production to the processing unit and prefer to transform themselves into various products in a controlled manner. The product will be sold to consumers through a retail trade which is owned by the breeder.

Long circuit: Milk collected through this circuit is used for the production of pasteurized milk and milk derivatives, which is ensured by industrial units and privately owned dairy cooperatives [2]. This is a circuit that is found in the case where farmers

deliver their produce totally processing unit using two intermediaries who are the collector and the collection center. After processing, the products will be shipped to retailers and to consumers in the last step.

The strong demand for milk expressed by consumers, as well as a distribution channel is defective causing severe shortages and creation itself, in some areas, a parallel market where the product is yielded twice the official price [1].

CONCLUSIONS

The dairy sector including import milk powder is another important hinderer. Increased milk production in cattle farms, should be the basic strategy element of the state in the sector. It would have allowed the expansion of irrigated perimeters therefore forage areas, better supervision of farmers by extension activities and more specifically on the professionalism required, due to the complexity of the activity.

Finally, the quality control of milk from the barn to the dairy is also a strategic issue, which depends to a large extent the value created by the supply basin. It is the role of cooperatives collection, including improved management methods and performance, the research and intervention in itself, with the design association of a compensation system all in taking better account of the individual efforts.

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