Revue Agrobiologia
www.agrobiologia.net
ISSN (Print): 2170-1652
e-ISSN (Online): 2507-7627

CONSUMPTION OF MILK AND DAIRY PRODUCTS ACCORDING TO DECILES: SURVEY OF ALGERIAN HOUSEHOLDS

RAMDANE Sidali*[1], BRAHIM Mahmoud[2], DJERMOUN Abdelkader[3] and HADJ SADOK Tahar[1]

1. University of BLIDA1, Faculty of natural science and life (Algeria)
2. University of Ziane ACHOUR – DJELFA, Faculty of economics (Algeria),
3. University of Hassiba BENBOUALI of CHLEF, Faculty of natural science and life (Algeria).

Reçu le17/05/2017, Révisé le 13/06/2017, Accepté et mis en ligne le 30/06/2017

Abstract

Objectives: Milk and its derivatives occupy the second place in relation to production and consumption. As such, this study focuses on the place of these foods on the table of Algerians in terms of food and nutrition according to the deciles.
Methods: Information was collected using the survey method, which targeted a reasoned sample of 2580 households spread over 26 wilayas. The analysis of the data was carried out by Student's statistical method.
Results: The results show that the consumption is variable, with proportionality between the quantities consumed and the deciles, according to the expenses. These quantities consumed cover the needs of 60% of the population surveyed in relation to the desirable type of food. Recombinant milk in sachets or powders is the main product consumed, with an inverse trend in relative portions relative to the deciles. Milk and dairy products are the main provider of calcium and vitamin B2 throughout deciles, but energy, protein, iron, phosphorus and other vitamins are not.
Conclusion: Our study showed the importance of milk and dairy products on the table of Algerian households, especially recombinant and powdered milk, for all deciles, due to many factors, such as, the improvement of the Algerian consumption model and the installation of new processing units, as well as the efforts made by the public authorities through imports in order to fill the gap in national production and the desire to satisfy the needs of the population in this area, consumption should not fall even if the subsidies are totally eliminated for the simple reason that milk is an animal protein source accessible to the majority of the population.
Key words*:* milk, dairy products, decile, household, consumption, Algeria.

LA CONSOMMATION DE LAIT ET PRODUITS LAITIERS EN FONCTION DES DÉCILES: ENQUÊTE AUPRÈS DES MÉNAGES ALGÉRIENS

Résumé

Objectifs: Le lait et ses dérivés occupent la deuxième place par rapport à la production et la consommation. A ce titre cette étude s'intéresse à la place de ces denrées sur la table des algériens sur le plan alimentaire et nutritionnelle en fonction des déciles.
Méthodes: Le recueil d'informations a été effectué par la méthode d'enquête (entretien), celle-ci a ciblé un échantillon raisonné de 2580 ménages réparti sur 26 wilayas. L'analyse des données a été effectuée par la méthode statistique de Student.
Résultats: Les résultats montrent que la consommation est variable, avec une proportionnalité entre les quantités consommées et les déciles, en fonction des dépenses. Ces quantités consommées couvrent les besoin de 60% de la population enquêtée par rapport à la ration alimentaire type souhaitable. Le lait recombiné en sachet ou en poudre est le principal produit consommé, avec une tendance inverse en portions relatives par rapport aux déciles. Le lait et produits laitiers constituent le principal pourvoyeur en calcium et en vitamine B2 à travers les déciles, ce n'est pas le cas de l'apport énergétique, protidique, en fer, phosphores et les autres vitamines.
Conclusion: Notre étude a montré l'importance du lait et produits laitiers sur la table des ménages algériens, en particulier le lait recombiné et en poudre, pour l'ensemble des déciles, ceci est dû à de nombreux facteurs, tel que, l'amélioration du modèle de consommation algérien, ainsi que l'installation de nouvelles unités de transformation, sans oublier les efforts déployés par les pouvoirs publics à travers les importations afin de combler le manque de la production nationale et le désir de satisfaire les besoins de la population en cette matière
Mots clés: Lait, laitage, décile, ménage, consommation, Algérie.

*Auteur correspondant: RAMDANE Sidali, University of BLIDA1, Faculty of Natural Science and Life (Algeria),
E-mail:ramdanesidali@yahoo.fr

INTRODUCTION

Milk and milk products have been consumed by humans since breeding began in the Neolithic period thousands of years ago. Today, milk consumption is universal, although variable, depending on traditions and other geographic and historic conditions. The African pastoralists such as the Masaî or Fulani are heavy consumers, while others such as the Eskimos or the Thais consume very little [1]. For all mammals, milk is the only food for the new-born. Yet, thanks to its richness, milk is able to cover all survival and growth needs of early mammal life.

Milk and milk products belong to a group of foods called protective. Milk is considered a complete food. It contains proteins for growth and tissues maintenance, calcium and phosphorus for growth and bones maintenance, lactose for energy, fats as energy reserve and finally essential vitamins for several vital functions. For the majority of people, milk is an accessible product because of its price. It covers part of animal proteins deficit and ensures a dietary ration more or less balanced. Algeria is no exception, and the Algerian government policy has always been to provide easy and cheap access to milk. However, all the efforts made to date by the Algerian state to improve the production of milk have not been successful. Local production satisfies only partially the growing needs of the population [2]. Milk represents the second biggest share of imported food products in Algeria. With on average of 18.4% of the total food bill, it costs the country an average of US$ 868 million per year [3, 4].

Since independence low food consumption has been one of the main features of the Algerian population. Nevertheless, food consumption has seen many changes throughout the years [5,6].

Although there is ample research on various economic and social issues in Algeria **[7]**, there is virtually no prior work on households' consumption in Algeria. To fill this gap in the literature, this paper aims to explore the food and nutritional situation of the Algerian household using data obtained from a survey of Algerian households.

In this paper we focus on the consumption of milk and milk products. In particular, we aim to answer two key questions: (i) what is the position of milk and its derivatives in the Algerian household ration? (ii) How may milk and milk products contribute to the energetic intake and the main nutrient needs of individuals in Algeria?

METHODOLOGY

Food surveys are an important source of scarce information. Surveys help researchers obtain hard facts, which in turn help them reach viable conclusions that are useful for social planners. Surveys help researchers gauge the living conditions and the nutritional situation of households, and identify potential imbalances between social categories. We therefore conducted a survey of Algerian households. The data were collected between March 2014 and February 2015.

We collected information from 2580 households from four majors regions (the central region with 1080 households, the eastern region with600 households, the western region with 500 households and the south with 400 households). Our survey is based on households which has obvious advantages compared with individual based surveys. For one thing, the consumption out-of-home does not have to be identified during the investigation. For another, household data captures the consumption pattern of several individuals in one go.

According to Pale [8], the determinants of milk consumption are not uniform and depend on social, economic and geographic characteristics. For instance, in a study on Senegal, Broutin et *al.* [9] found that the place of residence, income, price of products, seasonal variation and dietary habits are the most significant factors. On the other hand, Corniaux *et al.* [10] identified a different set of factors, namely, price, taste, hygiene, packaging, availability and dietary customs.

In this paper we will adopt a decile-based analysis. According to this method, the population is divided into ten equal groups, each of which represents 10% of the population. In our case, the sample is first ranked from lowest annual expenditure to the highest. The first 10% of observations

represent the lowest expenditure households on average, the second 10% are the second lowest and so on [11].

The information is collected using a survey structured in two parts. In the first part we collected the main characteristics of households. These include, the type of household (nuclear, i.e. childless couples or couples with children; or traditional, that is, enlarged family), the size of household, the age, education and profession of the head of household, and the type of expenditure. In the second part of the questionnaire, we collected information on the decile and distribution of expenditure.

We therefore recorded the total quantities of milk consumed in a week (in each season), which are then extrapolated to give quantities consumed by the household per year, as well as average quantities consumed by each individual within a household. This information allowed us to classify households in increasing order of expenditures and organise our sample in deciles by dividing it in ten groups (deciles) of 258 households.

Feed products are gathered in groups of products, such as milk and milk derivatives. As a benchmark, we use the Recommended Food Ration Type (RFRT) established by Autret [12]. The observed consumption is contrasted with this ration. To facilitate comparison, milk and milk products involved conversions of products consumed, as is bought (AIB) by expressing them in equivalent fresh milk (EFM).

A second measure is based on the analysis of energetic and nutritional condition of our target population. This required expressing physical quantities of as is bought (AIB) in comestible part (CP), in order to estimate quantities really ingested, and transformed in energy and nutrients. This is achieved for the whole of milk and milk derivatives by surveyed households. With the help of the food composition table of Autret [12], we have been able to convert what has been consumed in caloric and nutritional intake. We finally converted these units to kilograms by multiplying these quantities by 10 (the food composition table gives values of 100g for each type of food in question). This operation is performed for all food types consumed by our survey households.
Once we have intake values of each food for one year, the sum of all intakes gives the total intake of what it has been ingested during that year. Finally, since caloric and nutritional intake is usually express in a daily frequency, we divide the yearly figures by 365.

The statistical study by the Student method makes it possible to determine the homogeneous groups of consumption of milk and its derivatives according to the deciles. Means were compared by the Student test (α=5%), compared with pairs [13].

RESULTS AND DISCUSSION

1. *Consumption of milk and derivatives by deciles.*

We begin our results with a presentation of consumption on milk and derivatives by total household expenditure decile. As expected, consumption increases with increasing deciles. For example, the average consumption for the first, fifth and last deciles (in EFM) are 49.22Kg, 93.78Kg and 145.43Kg respectively. Assuming proportionality between quantities consumed and income, we observe a strong disparity of consumption of milk and milk derivatives between the lowest income decile and the highest by a factor of three. Half the population seems to be below the national average of 96.96 Kg. More specifically, the first decile consumption represents only 50.77% of that average, while the fifth decile represents 96.72% of the national average. Although it is natural that about half the sample should lie below the average (by construction), it is the extent of the disparity in consumption that is striking. Indeed, we observe an almost linear (increasing) trend across deciles. This implies that certain milk derivatives are well beyond the poorer section of the population. We notice also that even at the later deciles, this trend continues and shows no slowing down. This seems to imply that Algerian consumers have not yet reached the level of their European counterparts, who have access to more sophisticated milk products. Indeed, there are many milk products, such as certain types of cheddar, parmesan, and creams that are still unavailable in Algeria (Tab. 1, Fig. 1).

Table 1: Milk and milk products consumption according to deciles (in Kg/person/year)

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
A. Milk and milk products (in EFM)	49.22 ± 2.72	59.02 ± 3.09	72.40 ± 3.45	78.83 ± 3.94	93.78 ± 6.78	105.07 ± 6.38	111.40 ± 8.33	119.29 ± 8;82	135.13 ± 2.42	145.43 ± 5.16
Recommended Food Ration TypeIN ALGERIA	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00
Satisfaction rate (%)	61.53	73.77	90.50	98.54	117.22	131.34	139.25	149.12	168.91	181.78
a. Fresh Milk	32.45 ± 1.83	38.07 ± 2.20	42.99 ± 2.68	44.64 ± 1.83	46.67 ± 2.20	51.96 ± 2.68	54.65 ± 2.32	55.41 ± 2.32	58.04 ± 2.44	62.98 ± 4.27
a/A. Fresh milk to total milk consumption (%)	65.92	64.51	59.38	56.63	49.77	49.45	49.06	46.45	42.95	43.31
b.MILK POWDER (as in bought)	32.45 ± 1.83	38.07 ± 2.20	42.99 ± 2.68	44.64 ± 1.83	46.67 ± 2.20	51.96 ± 2.68	54.65 ± 2.32	55.41 ± 2.32	58.04 ± 2.44	62.98 ± 4.27
b'. MILK POWDER (equivalent Fresh Milk- EFM-)	11.88	15.12	21.36	24.72	34.56	39.12	41.88	48.24	55.08	58.68
b'/A. (%)	24.13	25.62	29.50	31.36	36.85	37.23	37.59	40.44	40.76	40.35
c- Buttermilk (as in bought)	32.45 ± 1.83	38.07 ± 2.20	42.99 ± 2.68	44.64 ± 1.83	46.67 ± 2.20	51.96 ± 2.68	54.65 ± 2.32	55.41 ± 2.32	58.04 ± 2.44	62.98 ± 4.27
c'- Buttermilk (equivalent Fresh Milk- EFM-)	3.80	4.40	5.71	6.15	7.92	8.06	8.15	8.21	10.18	9.33
c'/A (%)	7.72	7.46	7.89	7.80	8.45	7.67	7.32	6.88	7.53	6.42
d- ROTTEN MILK (as in bought)	0.87 ± 0.08	0.87 ± 0.08	1.51 ± 0.15	1.36 ± 0.11	2.03 ± 0.33	2.44 ± 0.42	1.74 ± 0.78	1.91 ± 0.95	2.31 ± 1.10	2.48 ± 1.40
d'- ROTTEN MILK (equivalent Fresh Milk- EFM-)	0.87	0.87	1.51	1.36	2.03	2.44	1.74	1.91	2.31	2.48
d'/A (%)	1.77	1.47	2.09	1.73	2.16	2.32	1.56	1.60	1.71	1.71
e- CHEESES (as in bought)	0.02 ± 0.01	0.03 ± 0.01	0.06 ± 0.01	0.15 ± 0.02	0.19 ± 0.02	0.25 ± 0.03	0.29 ± 0.02	0.33 ± 0.02	0.52 ± 0.02	0.69 ± 0.02
e'- CHEESES (equivalent Fresh Milk- EFM-)	0.16	0.24	0.48	1.20	1.52	2.00	2.32	2.64	4.16	5.52
e'/A (%)	0.33	0.41	0.66	1.52	1.62	1.90	2.08	2.21	3.08	3.80
f- YOGURT & OTHERS (as in bought)	0.02 ± 0.01	0.10 ± 0.01	0.11 ± 0.01	0.24 ± 0.01	0.34 ± 0.02	0.47 ± 0.05	0.84 ± 0.05	0.91 ± 0.06	1.69 ± 0.04	2.03 ± 0.08
f'- YOGURT & OTHERS (equivalent Fresh Milk- EFM-)	0.06	0.32	0.35	0.76	1.08	1.49	2.66	2.88	5.36	6.44
f'/A (%)	0.13	0.54	0.48	0.97	1.15	1.42	2.39	2.42	3.96	4.43

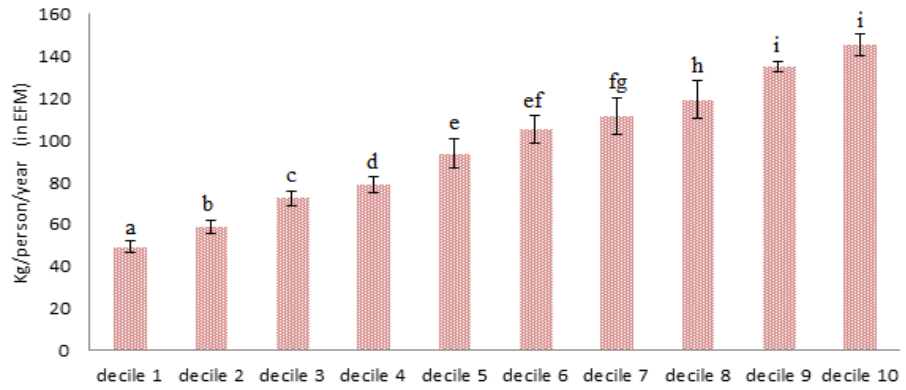

Figure1: Milk and milk products consumption by household expenditure deciles

The Recommended Food Ration Type (RFRT) in Algeria is estimated at 80kg (in EFM – Equivalent Fresh Milk). This threshold is satisfied by only 60% of surveyed households. Most of the poor households are well below this ration limit. In particular, the bottom decile households consume only three fifths of the required minimum of 80kg, the second decile consumes less than 74% of the required minimum, and only the fourth decile approaches the recommended minimum (98.54%). The top decile consumes 81.7% more than the RFRT, with a consumption of 145.43kg in EFM (Tab. 1, Fig. 2). It is important to note that an investigation conducted in 1988 by National Office of Statistics found that 80% of their sample covered the desirable ration [14]. Our finding that only 60% of households are above the limit implies that the consumption of milk and milk derivatives has decreased substantially since 1988.At first sight this result seems contradictory.

In the late 1980s the price of oil was much less than the present and per capita income was a lot smaller. How can we explain that the poorer population consumes more milk and milk derivatives than the relatively well off? We contend that the explanation of this puzzle lies in the presence of substitutes. The poorer consumers of 1988 had a few alternatives to the subsidised milk and, therefore, consumed more milk relative to other goods. The richer population of the post oil boom (2001-present) have sufficient income to move to other alternatives, including meat, vegetables and fruits.

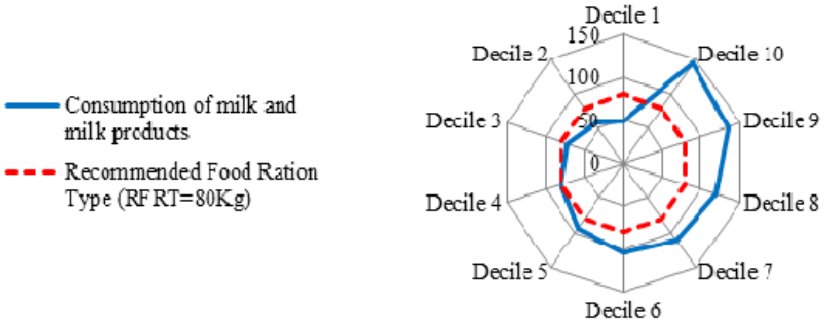

Figure 2: Consumption of milk and milk products by deciles with Recommended Food Ration Type (RFRT= 80kg)

The consumption of fresh milk is proportionate to expenditures, increasing from 32.45kg for the first decile by a factor of 2 for the top decile (62.98kg). The proportion of fresh milk consumption to total consumption of milk and milk derivatives is inversely related to expenditure, going from two thirds for the bottom decile to half for the fifth decile, to level up at around 43% for the richer top three deciles.

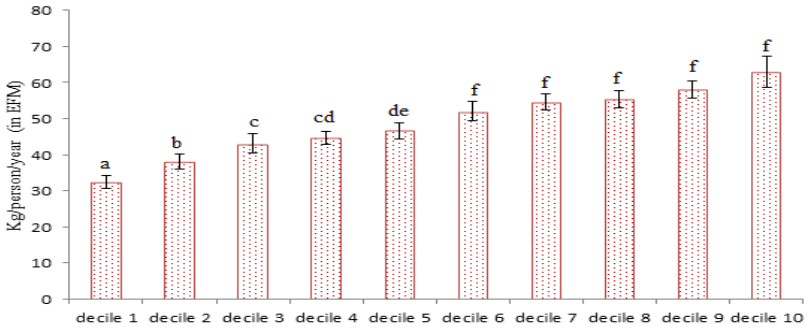

Figure 3: Fresh milk consumption by deciles

Consumption of milk powder increases monotonically with expenditure, varying from 11.88Kg (0.99Kg in as is bought (AIB)) for the bottom decile, to 34.56Kg (2.88Kg in AIB) for the fifth decile, reaching 58.68Kg (4.89Kg as is AIB) for the top decile. As milk powder is a complement of fresh milk, these two products capture most of the milk and milk derivative consumption (nearly 90% for the poorest section of the population represented by the bottom decile, to slightly more than 80% for the richest decile represented by the top decile).
(Tab.1, Fig. 3 and 4).

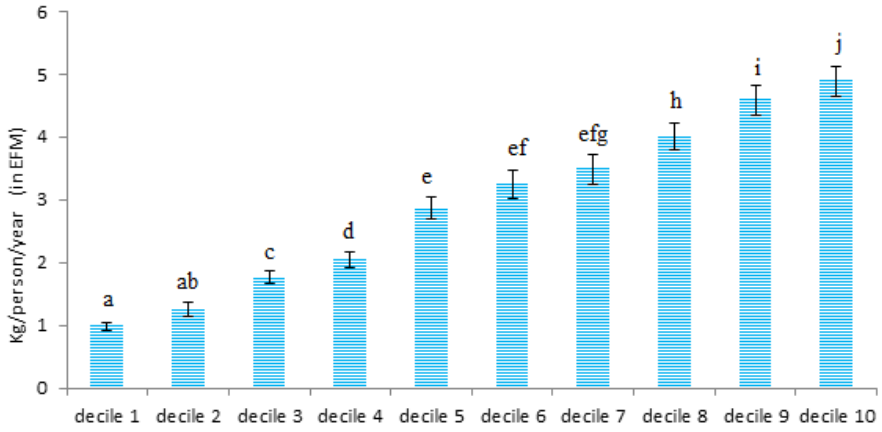

Figure 4: Powder milk consumption by deciles

The consumption of whey is also related positively to expenditure, rising from 3.80Kg (3.04Kg in AIB) for the bottom decile, doubling fort the fifth decile, and reaching 10.18 Kg (8.15 Kg in AIB) for the ninth decile. The richest decile (tenth decile) appears to consume less buttermilk, suggesting a dietary structural break at the top 10% of the population compared with the rest. The share of buttermilk in total consumption varies slightly across deciles, between 6.42% and 8.45%. Consumption of rotten milk is much lower, and varies between 1.47% and 2.32% of total milk consumption. The greater consumption of buttermilk reflects the Algerian dietary preference for having couscous with buttermilk rather than rotten milk (Tab. 1, Fig. 5 and 6).

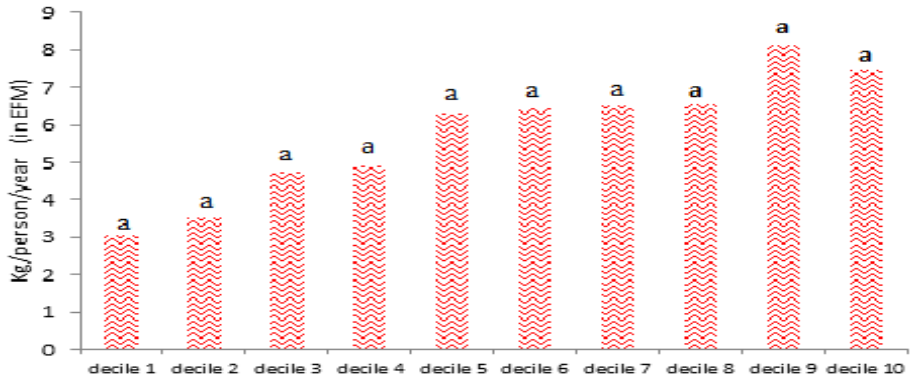

Figure 5: Whey consumption by deciles

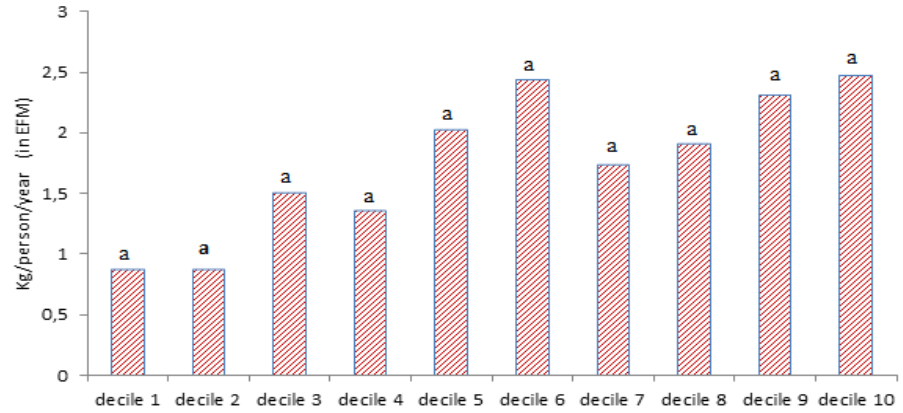

Figure 6: Rotten milk consumption by deciles

Cheese is not prominent in the Algerian menu, especially for the poorer sections of the population. The first three deciles consume between 0.16Kg EFM to 0.48Kg EFM, while consumption leaps to 4.16Kg EFM) and 5.52Kg EFM for the ninth and tenth deciles respectively. The part of cheese in the total of this food group, varies of 0.33% (decile 1) to 1.62% (decile 5), until reaching 3.80% for the richer decile. This extreme discrepancy between the rich and the poor can be explained by the fact that this type of product is not subsidised and, thus, the poorer sections of society are less able to consume greater quantities (Tab.1, Fig. 7).

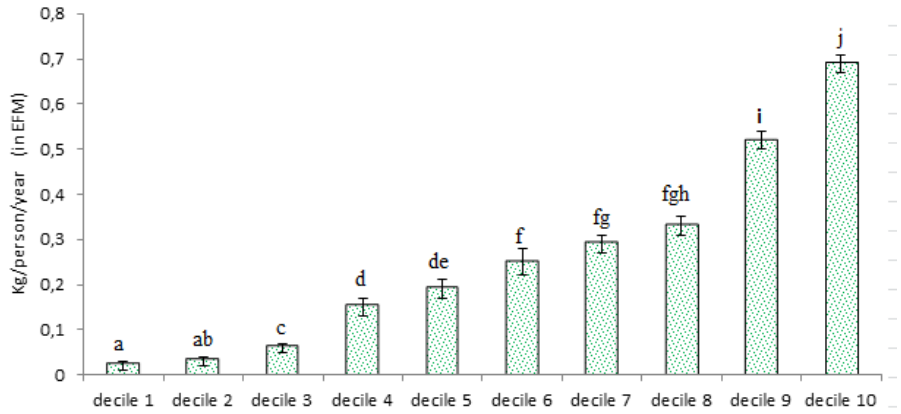

Figure 7: Cheese consumption by deciles

Yogurt and other milk products consumption is very low for the poorer deciles and nearly inexistent for the poorest household (bottom decile) with a consumption of 0.06 Kg (0.02Kg in AIB). However, consumption is much greater for higher income households with 1.49Kg (0.47 Kg in AIB), 2.66Kg (0.84kg in AIB.), and 6.44Kg (2.03 Kg in AIB) for the sixth, seventh and tenth deciles respectively. In relative terms, the consumption of yogurt and other products relative to total consumption is extremely low for the poorest households (0.13% for the bottom decile), but moderate for the richest (4.43% for the top decile) (Tab.1, Fig. 8).

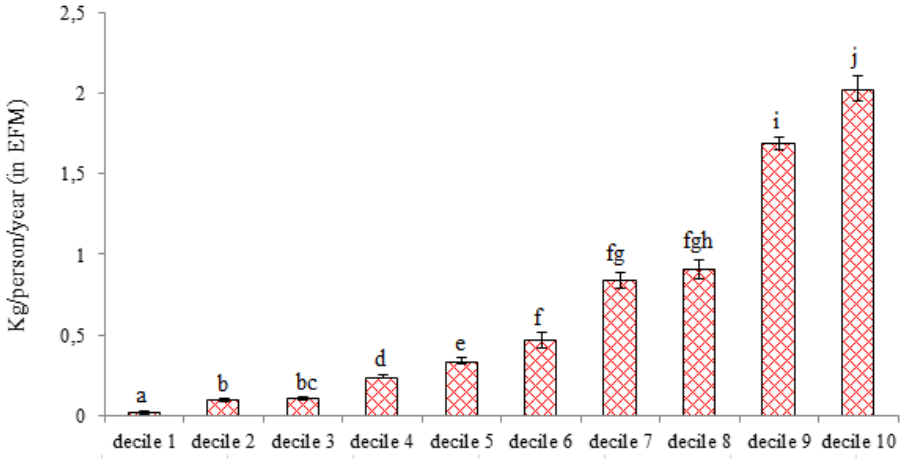

Figure 8: Yogurt and others consumption by deciles

The statistical study of the consumption of milk and milk products showed that there is a significant difference across the deciles, especially for the first five (a to i), two intermediate groups (ef and fg), the differences become weak for the richest decile. The analysis showed that the fresh milk consumption in the first three deciles is distinct (a, b and c), followed by two intermediate groups (and cd). The difference begins to diminish from the decile 5 (f).

The trend is the same for milk powder which has a heterogeneous consumption in the first five deciles (a, b, c, d, and e) deciles 6 (ef) and 7 (ef and g) reveal intermediary groups, the three richest deciles record different groups.

As against the consumption of whey and curd shows that there are no significant differences between deciles, despite the recorded variations. This is confirmed by statistical analysis, which includes all deciles in one group.

We find that particularly dairy consumption cheeses, yoghurts and other records of more or less small differences. It was not until the fourth decile that evolution becomes significant and more pronounced, especially for the two richest deciles (deciles 9 and 10).

2. *Contribution of milk and derivatives in energy and nutritional intake according to deciles.*

The share of milk and derivatives in total caloric intake is proportional to household's income, varying between 7.05% and 7.66% for the bottom three deciles, and between 8.08% and 8.51% for average income households (deciles 4, 5 and 6). The richest households are not very different from the middle decile, with around one percentage point increase in share (9.25% to 9.70% for deciles 7, 8 and 10).

The proteinic intake relating to food milk and milk products group in the total intake varies from 9.09% for the bottom decile, to 10.38% for the fifth decile, to reach 12.09% for the top decile. For the lipidic intake, we observe an opposite trend of 12.06% to 10.72% and finally 9.47% for the first, fifth and top deciles respectively.

For the majority households, milk is the most accessible product because of its price. Milk reduces animal proteins deficit and ensures a more or less balanced food ration. It should be noted that milk products supply between 15% and 20% of the totals lipids in France **[15]**. While our survey sets out a maximum value of 12.06%, with an average of 10.74% across the sample. This shows significant differences of between 6 and 8 percentage points in intake of this element between Algeria and France.

As for mineral intake, calcium, which is abundant in milk and milk products, represents between a low of 45.72% and a maximum 50.87% of total intake of calcium across deciles. At the same time, the average contribution in phosphorus and iron in Algerian households is 15.29% and 5.13% respectively. An inventory of 30 studies on calcium contribution in France over a period of twenty years showed that more than 66% of ingested calcium comes milk and milk products [16]. In contrast, our investigation shows that relative part of milk and milk products as providers of calcium are substantially below the French standards.

In France, 25% of iron intake comes from meat and fish. The remaining 75% come from vegetables or milk and derivatives [17]. Although we do not have the exact contribution of milk in iron intakes, the highest intake by Algerian household is 5.85%, which seems to be far below the average iron intake in France.

Vitamin intake is marked by the importance of milk and derivatives' contribution in vitamin B2 intake. The relative intake is inversely related to household expenditure, varying from 36.01% for the poorest households to 27.48% for the top decile. The same tendency is found for vitamin B3 (niacin) (13.97% to 15.90% across deciles), vitamin (ascorbic acid) (2.65% to 1.36%), and vitamin A (10.23% to 6.67%). Households draw about 4.50% of their vitamin B1 (thiamine) on average from milk and derivatives. In France [18] 35% of riboflavin needs comes from milk products. This is very close to the figure of 31.99% obtained in our survey.

There are two types of milk available to consumers, namely, "fresh" cow milk, produced by local farmers, and imported milk in the form of powder. The latter is reconstituted and sold at subsidised prices. This policy has been practiced for decades in Algeria, with a view of making available cheap milk for low income households[19, 20, 21, 22].
Consumption of milk and derivatives went through a rapid growth, increasing from 54kg/inhabitant/year in 1970 to 112kg/in habitant/year in 1990, and reaching 120kg up to recently **[23]**.

This is greater than the average of 96.96kg found in our survey, and is an indication that not all subsidised mil is reaching the local population, especially the poorer sections. Indeed, there may well be problems of milk diversion across the border to neighbouring countries, and within the border, such as expensive types of cheeses offered to the richer segments of the population.

Internationally, Algeria rests in the middle. Milk consumption reaches 132 kg/year in Finland, 109.3kg in Australia, and 106.2kg in the UK [24]. Our sample shows an average of 83.85 kg (fresh cow's milk and milk in plastic bag in fresh milk equivalent). Thus, Algeria is very close to Spain with 83.2kg, and much greater than China, Turkey, Ukraine and Egypt with 15.9kg, 16.5kg, 19.9kg and 24.5 Kg respectively [24].

For dairy products, cheese remains the most important item. The world's largest consumers of cheese are France, Germany, Italy and Holland who consume 26.2 kg, 24.3 kg, 20.9 kg and 19.4kg per person per year respectively. Our sample shows that Algerians consume only a fraction of these cheese intensive nations, with only 0.25kg. Nevertheless, other countries also show low cheese consumption. For example, China consumes 0.1kg, Colombia 0.9 kg, and Egypt 1.5 kg [24].

Yoghurt consumption, milk-based desserts and other products are very limited for the poor households. Their consumption, however, increases with income for the obvious reason that the prices of these products are not subsidised. The large relative consumption of reconstituted milk by the poorer sections of the population reflect the strong subsidy of the 'plastic bag' milk. The supply of dairy products produced locally or imported diversified on the Algerian market, with a net increase of businesses in this sector; in addition that Algeria is open to a wide range of these products from abroad especially leading brands worldwide.

Rotten milk (*raib*) and buttermilk (*lben*), are for the greater part traditional products. Consumption of these products is generally linked to family and religious events, which require certain customary meals, such as *couscous* and *rechta*. Milk and milk products are particularly important for the health and well-being of the population.

CONCLUSION

Due to the importance of milk and its derivatives in relation to production and consumption, this food group ranks second among imported food products in Algeria, and our study focuses on the place of these products on the table of Algerians in terms of food and nutrition according to deciles.

The method of questionnaire survey was used for the collection of information.This survey targeted a reasoned sample of 2580 households spread over 26 wilayas. In addition, the analysis of the data was carried out by Student's statistical method.

This study has shown the importance of milk and milk products for the Algerian households. Milk in plastic bag (reconstituted milk) and in powder is consumed in large quantities across all segments of the Algerian population, although higher income households consume relative greater quantities. Although the consumption of milk is smaller than most West European countries, it is nevertheless far greater than many developing countries. In particular, the average consumer in Algeria consumes five to six times more milk than African Sub-Saharan consumer.

This high level of consumption is the result of several factors. One such factor is the installation of many transformation units to satisfy ever increasing demand. Another is the efforts expanded by public authorities through importations of milk powder in order to overcome the gap in local production. A third factor is the important subsidy of imported milk. It is clearly important that the government should maintain all these factors for the simple reason that milk constitutes an important source of animal protein that is easily and cheaply accessible to the population.For other milk products and derivatives, the picture is different. Consumption is strongly and inversely linked to household income. We have observed negligible consumption levels for poorer households. By contrast, wealthier deciles are being increasingly attracted towards more refined products. The poor do not have much access to these refined products because their

prices are not regulated. Yet, these products do benefit from price subsidies of fresh milk. In the end, it seems that it is the rich, rather than the poor, who get the benefit of cheaper milk prices.Finally, milk and milk products are the top provider in calcium and in niacin in Algeria. In contrast, milk and milk products contribute much less to caloric intake and other nutrients (lipid, iron, phosphorus, vitamin A, B1 and C).

BIBLIOGRAPHICAL REFERENCES

[1] Lecerf J.M., (2010). Lait et santé, rumeurs vérités et qualité scientifique, http://julienriou.com/anaislaffond/siteweb/wp-content/uploads/2010/12/produits-laitiers.pdf, consulted 15/04/2016

[2] Kherzat B., (2007). Essai d'évaluation de la politique laitière en perspective de l'adhésion de l'Algérie à l'Organisation Mondiale du Commerce et à la Zone de Libre Echange avec l'Union Européenne. Mémoire de magister en sciences agronomiques, Spécialité : Economie rurale, Option : Développement rural, Institut National Agronomique –EL HARRACH- Alger, 109 p

[3] CNIS - Centre National de l'Information et des Statistiques, (2013). Statistiques du commerce extérieur de l'Algérie. Ministère des finances. Direction Générale des Douanes.

[4] Makhlouf M., Montaigne E., Tessa A., (2015). La politique laitière algérienne: entre sécurité alimentaire et soutien différentiel de la consommation. Revue New Médit, BARI (Italie) n°1/2015, p12-23

[5] Malassis L., (1988). Histoire de l'agriculture, histoire de l'alimentation, histoire générale. Economie rurale, 184: 192-198

[6] Chikhi K., Padilla M., (2014). L'alimentation en Algérie, quelle forme de modernité. Revue New Medit, BARI (Italie) vol. 13, n°3, p50-58

[7] Padilla M. et Thiombiano T., (1992). Consommation et demande alimentaires. in : Initiation à l'économie agro-alimentaire, ouvrage collectif sous la coordination de Malassis L. et Ghersi G., Université francophone, UREF, Edition Hatier, Paris. p335

[8] Pale E., (2006). Analyse de la consommation du lait et produits laitiers, le cas de la ville de Bobo-Dioulasso. Mémoire d'ingénieur du développement rural, option: sociologie et économie rurales, université polytechnique de Bobo-Dioulassou, Burkina Faso. p45

[9] Broutin C., Francois M., Ndoye F., Sokona K., Marpeau G., (2002). Analyse de la consommation des produits laitiers à Kolda. Programme INCO MPE agroalimentaires, Synthèse des résultats. Dakar : GRET – Enda GRAF, 21 p.

[10] Corniaux C., Niafo Y., Poccard Chapuis R., Coulybaly D., (2005). Consommation de lait et de produits laitiers dans les ménages de Ségou. Ségou: Projet FSP Lait, p22

[11] ONS, **(2011).** Premiers résultats de l'enquête nationale sur les dépenses de consommation et le niveau de vie des ménages 2011. Office National des Statistiques, Alger.

[12] Autret M., (1978). Analyse nutritionnelle de l'enquête nationale sur la consommation et les budgets des ménages- Algérie-. AARDES et FAO, Rome.

[13]Dagnelie P., (2003). Principes d'expérimentation, planification des expériences et analyse de leurs résultats. Ed. Les presses agronomiques de Gembloux, Gembloux, Belgique. p398

[14] ONS, **(1992).** Collection statistiques N° 45, direction des statistiques sociales, Office National des Statistiques, Alger.

[15] Martin A, (2010). Apports nutritionnels conseillés pour la population française. Ouvrage collectif sous la coordination générale d'Ambroise MARTIN, Editions TEC & DOC Lavoisier, Paris, 3éme édition, 9éme tirage.

[16] Guéguen L. et Pointillart A., (2000). The bioavailability of dietary calcium» J Am Coll Nut: 119S – 136S

[17] Hercberg S., Preziosi P., Galan P., Deheeger M, Dupin H., (1991). Apport nutritionnels d'un échantillon représentatif de la population de Val de Marne: Les apports en C macronutriments. Rev. Epidémiol. Santé Publique; 39: 233-244

[18] Costa de Carvalho M., Guilland J., Moreau D., Boggio V., Fuchs F.; (1996). Vitamin status of health subjects in Burgundy (France). Ann. Nut. Métab.; 40: 25-51

[19] Amellal R., (1995). La filière lait en Algérie: entre l'objectif de la sécurité alimentaire et

la réalité de la dépendance. Les agricultures maghrébines à l'aube de l'an 2000. Montpellier: CIHEAM, 229-238, Options Méditerranéennes, Série B 14.

[20] Bourbia R., (1998). L'approvisionnement alimentaire urbain dans une économie de transition: Le cas de la distribution du lait et des produits laitiers de l'ORLAC dans la ville d'Alger. Centre International de Hautes Etudes Agronomiques Méditerranéennes/ Institut Agronomique Méditerranéen, Montpellier. Thèse Master of Sciences.

[21] Bencharif A., (2001). Stratégie des acteurs de la filière lait en Algérie: état des lieux et problématiques. In: Les filières et marchés du lait et dérivés en Méditerranée. Option Méditerranéenne, B 32, pp.25-45

[22] Belhadia M., Yakhlef H., Bourbouze A., Djermoun A., (2014). Production et mise sur le marché du lait en Algérie, entre formel et informel. Stratégies des éleveurs du périmètre irrigué du Haut-Cheliff. Revue New Medit, BARI (Italie) 1/2014, p41-49

[23] Kacimi El Hassani S., (2013). La dépendance alimentaire en Algérie: importation de lait en poudre versus production locale, quelle évolution?.Mediterranean Journal of Social Sciences Vol 4 No 11, ROME (Italie).

[24] CNIEL, (2012). Le comportement des consommateurs.Le CentreNational Interprofessionnel de l'Economie Laitière, Paris,http://www.produits-laitiers.com/le-comportement-des-consommateurs/consulted 22/06/2016.