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Caracterisation Phenotypique of Lactic Bacteries Isolees from Believed Milk of Goat of Two Caprine Populations Local Arabia and Kabyle

[1]N. Laouabdia Sellami, [2]A. Badis, [3]D. Guetarni, [4]R. Ouzrout and [5]M. Kihal
[1]Department of Biology, Faculty of Science, University of Badji Mokhtar, 23000-Annaba, Algeria
[2]Laboratory of Biochemical Microbiology, Faculty of Science, University of Blida, 9000-Blida, Algeria
[3]University of Blida 9000-Blida, Algeria
[4]Veterinary Center, University of El Tarf 36000-El Tarf, Algeria
[5]Laboratory of Microbiology, Department of Biology, Faculty of Science, University Es-senia Oran, Algeria

Abstract: The qualitative distribution of lactic acid bacteria was studied in raw goat's milk of too Algeria's breeds (Kabyle and Arabia). This distribution showed that genus lactobacillus is definitely predominate in kabyle breed (61.48%), follow up, by Lactococcus (22.9%), streptococcus (8.88%), Leuconostoc (5.92%) and by far, the genus Pediococcus (0.74%), while the Leuconostoc and Lactococcus are similarly represented in Arabia (32.64 and 31.02% respectively), follow-up by Lactobacillus (15.27%), streptococcus (14.82%) and pediococcus with fable representation (6.25%). The identification of 240 isolates among morphological, physiological and biochemical criteria have been reattached them with 28 species with the most dominant are Lactobacillus brevis (20 isolates), *Lactobacillus casei* subsp *casei* (20 isolates), *Lactobacillus plantarum* (16 isolates), *Lactococcus lactis* subsp lactis (14 isolates) and *pediococcus.acudlactici* (12 isolates).

Key words: Caracterisation phenotypique, lactic bacteries, milk of goat, caprine population

INTRODUCTION

The lactic bacteria form a very mixed group composes of hulls and bacilli, whose principal characteristic is the lactic production of acid starting from the fermentation of sugars. Nonpathogenic, these bacteria with positive colouring of gram (Gram-plus) one T an optional anaerobic metabolism and do not produce a catalase. The bacteria colonize varied natural environments such that the surface of the plants and the mucous membranes of the mammals (intestine, stops, vagina and surface of the skin). Their use appeared, since millenia, in the manufacture of food like cheeses, the pork-butcheries, drinks fermented, the leavened bread, sauces, the brines, vegetables fermented, ensilages etc...

They allow, of share their metabolism, to increase the shelf life of origin of the food products and a savour and a different texture confer to them. The insulation of the lactic bacteria starting from goat's milk corresponds on an interesting subject bus little information are available in the literature on the micro-organisms, having a technological importance, isolated starting from ewe and goat's milk. In Algeria, the caprine breeding comes in second position (14%) after the sheep (26%) (Anonymous, 2000). It is concentrated primarily in the zones of mountains of high plateaus and the arid areas. it is characterized by its adaptation to the climatic conditions of the country and contributes to the formation of the income and the cover of the requirements in, milk and meat of a broad section of the population in the majority of the difficult zones (mountains, high plateaus and arid areas). During the last decade, the annual production of milk is approximately 1 billion liters including goat's milk 13% (Anonymous, 200b). The goat's milk transformation into Raib, Lben and Jben (traditional cheese), generally of varied sensory quality, is done by spontaneous fermentation.

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Corresponding Author: N. Laouabdia Sellami, Department of Biology, Faculty of Science, University of Badji Mokhtar, 23000-Annaba, Algeria

a technological importance, isolated starting from ewe and goat's milk. In Algeria, the caprine breeding comes in second position (14%) after the sheep (26%) (Anonymous, 2000). It is concentrated primarily in the zones of mountains of high plateaus and the arid areas. it is characterized by its adaptation to the climatic conditions of the country and contributes to the formation of the income and the cover of the requirements in, milk and meat of a broad section of the population in the majority of the difficult zones (mountains, high plateaus and arid areas). During the last decade, the annual production of milk is approximately 1 billion liters including goat's milk 13% (Anonymous, 2000b). The goat's milk transformation into Raib, Lben and Jben (traditional cheese), generally of varied sensory quality, is done by spontaneous ferment.

MATERIALS AND METHODS

Site of study and sampling: The taking away of milk came from goats of the population Arabia de Djelfa and the population Kabyle of Tizi Ouzou (large Kabylie). The 19 milk samples were taken on 2 varieties of goats distributed as follows:

- Ten taking away starting from 10 goats of the same Kabyle. Variety
- Last 9 taking away starting from 9 goats of the same Arabia variety.

After washing with soapy water, rinsing with the water chlorinated then dried with a sterile lingette of worse (without trayon) of the goat, the milk collected in sterile bottles (100 mL flacon^{-1}) dice first jets then sampled during the same period due to fodder availability during two years in Mars (2001 for the Kabyle variety and 2002 for the Arabia variety.

Obtaining the isolates: The selective insulation of the lactic bacteria by culture on several mediums was carried out according to the methods described by the International Federation of Milk (Fédération). After dilution of the samples in a solution of Ringer to the ¼ sterile we proceeded to the insulation of the various micro-organisms mentioned in Table 1. The microbio-logical analyses are made directly starting from the taking away or after enrichment by incubation with 30 and 45°C, until coagulation.

Conservation of the isolates: The short-term conservation of the pure stocks is carried out on tilted solid medium. After growth at the optimal temperature, the cultures are May held with 4°C and the renewal of the stocks is done by road repair every 4 weeks. The long-term conservation of the isolates purified is carried out in a medium containing skimmed milk 70% (enriched by 0.05% of extract from yeast and 0.05% of glucose) and glycerol 30% and stored at a temperature of -20°C (Samelis *et al*., 1994; Herrero *et al*., 1996).

Table 1: Mediums used and conditions of incubation for the insulation of the lactic bacteria

Micro-organisms	Mediums of insulation	T°C	Lasted (h)	Incubation
Streptocoques Lactiques	M17 (Terzaghi and Sandine, 1975)	42-48	72	Aerobiosis
Lactocoques	Eliezer (Elliker *et al*., 1956)	30	72	Aerobiosis
Leuconostocs	Hypersaccharose (Mayeux *et al*., 1962)	25	72-144	Aerobiosis
Pediocoques	M17	30	72	Aerobiosis
Lactobacilles Mésophiles	MRS (De Man *et al*., 1960)	30	24-36	Anaérobiose
Lactobacilles Thermophiles	MRS	45	24-36	Anaérobiose

°C optimal temperature of growth 4

Determination of the isolates: The identification of the lactic isolates of bacteria at the stage kind was carried out in two stages. The first consists in testing all the isolates by the colouring of Gram, second is based on the morphological study (macroscopic and microscopic) and the type of fermentation. The isolates representative of the dominant flora, were identified at the stage species on the basis of identifying information reported by several authors as follows:

- For the kinds Lactobacillus (Johnson *et al*., 1980; Kandler and Weiss, 1986; Bottazi, 1988; Falsen *et al*., 1999; Characteris *et al*., 2001; Klein, 2001).
- For Streptococcus and Lactococcus (Schleifer *et al*., 1985; Samelis *et al*., 1994).
- For Leuconostoc Pediococcus (Devoyod and Poullain, 1988; Lopez and Mayo, 1997; Bissonnette *et al*., 2000).

The physiological and biochemical criteria are based on the following tests: The test of Scherman and the thermoresistance with 60.5°C during 30 mn (Samelis *et al*., 1994).

- The growth on M17 medium and MRS, was followed for the temperatures of 5 and 10°C after incubation of 5-7 days and 37, 40 and 45°C after incubation of 24-48 h. According to the temperatures, the isolates of the kinds were tested as follows: Leuconostoc with 5°C, Streptococcus and Lactococcus with 10°C, Leuconostoc with 37°C, Pediococcus, Streptococcus and Lactococcus with 40°C, Streptococcus, Lactococcus, Lactobacillus, Pediococcus and Leuconostoc with 45°C.

- The production of the Arginine Dihydrolase (ADH) on the medium M16 BPC of Thomas (Thomas *et al*., 1973) and hydrolizes it esculine according to the method of Millière *et al*. (1989).
- The traditional fermentation of the carbohydrates in galleries of tubes on liquid medium MRS and M17 containing the crimson of bromocrésol (0.04 g L^{-1}) like indicator of pH and added with 1% with carbohydrates. The carbohydrates tested are: lactose, glucose, saccharose, galactose, sorbitol, mannose, mélézitose, raffinose, arabinose, xylose, métibiose, fructose and cellobiose.
- The ability to grow on M17 medium and MRS in the presence of NaCl with various concentrations and various values of pH at summer observed during 2-3 days of incubation. The isolates of the kinds were tested as follows: Streptococcus Lactococcus and Lactobacillus with 2% and NaCl 4% and pH 4.5 and 6.5, Leuconostoc with 3 and 6.5% of NaCl and pH 4.5, 4.8 and 6.5 and Pediococcus with 2, 3, 4 and 6.5% of NaCl and pH 4.2, 4.8, 7.0 and 8.0.
- Only the isolates of the kinds Lactococcus, Leuconostoc and Pediococcus were tested for the production of acétoïne in skimmed milk medium according to the technique described by Schmitt *et al*. (1990).
- The production of dextrane starting from saccharose on solid medium MSE of Mayeux *et al*. (1962) was applied for the isolates of Leuconostoc only and the use of citrate to medium Kempler and Mc Kay (1980) pour the isolates Streptococcus and Lactococcus.

RESULTS AND DISCUSSION

Choice of the isolates: From the 19 milk samples, we obtained 919 isolates isolates (48-49 isolates per sample) from which 567 isolates were retained, all in positive Gram, negative catalase and asporulants. Among the 567 remaining isolates, only 240 isolates representative of the dominant flora were identified in a complete way by the phenotypical methods.

Identifications of the isolates: The 567 isolates were attached to 5 groups and were distributed by order of predominance as follows: lactocoques (165 isolates, 29.1%), leuconostocs (149 isolates, 26.28%), lactobacilles (149 isolates, 26.28%), streptocoques (76 isolates, 13.4%) and pediocoques (28 isolates, 4.9%) and paid in the Table 2 results of the 240 isolates of stage species are represented in Table 3. the distribution of the 28 species supposed identified is presented according to the kind.

Table 2: Morphological and physiological characters of the supposed kinds of the insulated lactic bacteria

Macro morphology	Micro morphology	Type of fermentation	T°C	Groups (a no. of isolates)
Round or lenticular white colonies	Coccis, Diplocoques and in chain	Homo fermentaire	42-48	Streptocoques (76)
Round or lenticular white colonies	Coccis, Diplocoques and in chain	Homo fermentaire	30	Lactocoques (165)
Very small, Round Transparent colonies	Coccis, ovals, in chain	Hétéro fermentaire	30	Leuconostocs (149)
Colonies smooth Round, white or gray	Coccis into tetrad	Homo fermentaire	30	Pediocoques (28)
Small White Colonies in maroon and convex center	Rolled up or Filamentous long Sticks, insulated or in chains	Homo fermentaire	45	Lactobacilles (88)
Round or Lenticular white colonies	Small sticks in chains	Homo fermentaire+ Hétéro fermentaire	30	Lactobacillesb (61)

T°C: Optimal temperature of insulation; Arginine+

Species of lactococcus: On the whole 49 isolates were identified with the lactococcus. Compared to the test of the ADH and the production of acetoïne, they were subdivided in species and under species.

ADH+ and acetoïne+: Ten isolates of Lc.lactis subsplactis. biovar diacetylactis (all the isolates produced the acetoïne, had the arginine dihydrolase and hydrolized the esculine).

ADH+ and acetoine-: Fourteen isolates of Lc.lactis subsp. lactis (positive growth with 4% NaCl) and 4 isolates of Lc.lactis subsp.hordnae (not of growth with NaCl 4%).

ADH- and acetoine+: Four isolates of Lc lactis subsp cremoris (using very few carbohydrates), 13 isolates of Lc plantarum, 2 isolates of Lc gariae and 2 isolates of Lc raffinolactis (these 3 species different only by fermentation from mélizétose and sorbitol).

The species Lc lactis subsp. lactis with the biovar, diacetylactis characterized in our isolates is largely used in the dairy products with the other species Lc lactis subsp. cremoris, Lc lactis subsp. hordinae, Lc plantarum, Lc raffinolactis, Lc garvieae as reported by Garvie. It is important to announce the 4 isolates of Lactococcus lactis subsp. cremoris, obtained in our case, also described in Morocco and in the east of Europe (Salama *et al*., 1995), because these stocks become rare in the industrialized countries.

Species of streptococcus: The 57 isolate identify with the kind Streptococcus, 23 were attached to Streptococcus

Table 3: Biochemical and physiological creteria of the supposed species of the lactic bacteria isolated from believed milk of goat

Espèce présumées	ADH	ESC	ACT	CTR	DXT	5°C	10°C	37°C	40°C	45°C	GA-Z	PH 4.2	PH 4.5	PH 4.8	PH 6.5	PH7	PH	RES	2%	3%	4%	6.5%
Lbacillus helveticus (45)	-	-								-	-		+		-			+	-		-	
Lb.plantarum(30)	-	+								-	-		+		+			-	+		+	
Lb.brevis (25)	+	V								-	+		+		+			-	+		-	
Lb.casel subsp.casel (24)	-	+								V	-		+		+			-	+		+	
Lb.bulgaricus(26)	-	-								+	-		+		+			-	-		-	
Lb.rhamnosus(20)	-	+								+	-		+		+			-	+		+	
Lb.casei subsp. alactosus (14)	-	+								-	-		+		+			+	-		-	
Lb lactis (13)	V	+								+	-		+		+			-	+		-	
Lb.acidophilus (01)	-	+								+	-		+		+			-	+		-	
Lb.animalis (01)	+	±								+	-		+		+			+	+		-	
Lb.amylophilus (01)	-	-								-	-		±		+			-	±		+	
Streptococcus therphilus(46)	-	-		-			-		+	+	-		-		+			+	V		-	-
Lc.diacetylactis (18)	+	+	+	+			+		+	-	-		-		+			V	+		+	-
Lc.lactis subsp.latis (25)	+	+	-	-			+		+	-	-		-		+			V	+		+	-
Lc.plantarum (22)	-	+	+	-			+		V	-	-		+		+			-	+		+	-
Lc.lactis subsp. hordnae (11)	+	+	-	±			+		-	-	-		-		+			-	+		-	-
Lc.lactis subsp. crimoris(10)	-	V	++	-			+		-	-	-		-		+			-	+		-	-
Lc.garviae (02)	+	+	+	-			+		+	-	-		+		-			-	+		+	-
Lc.raffinolactis(02)	V	+	-	v			+		-	-	-		-		-			-	+		-	-
Leuconostoc lactis (11)	-	-	-		-	-		+		-	+			-	+			+		+		-
Ln.mesenetroides subps. dextranicum (04)	-	±	+		+	-		+		+	+			-	+			-		±		-
Ln.amelibiosum(07)	-	-	+		+	-		+		-	+			+	+			-		+		-
W.paramesenteroides(10)	-		+		-	+		±		-	+			±	+			-		±		±
Ln. Mesenetroides subps.cremoris(07)	-	-	+		-	+		-		-	+			-	+			-		-		-
Ln.pseudomesenet-roides(02)	-	±	+		-	+		+		+	+			+	-			-		+		-
Pediococcus damnosus (06)	-	-	V							-	-	-	-			-	-	-			-	-
p.acidiactici (12)	+	+	+							+	-	V	+			+	V	+			+	V
p.parvulus(03)	+	-	-							-		+	+			+	-	-			+	+

A number of isolates really tested +: more than 90% of reaction positive, -: less than 10% and less positive creations. ADH: production of the arginine dihydrolase. ESC: hydrolize esculine ACT: production of acetoïne. CTR: Citrate DXT degradation: production of dextrane LMBO: thermorésistance with 63.5°C during 30 min. GAS: production of gas starting from glucose%: Na Cl concentration

thermophilus. These 23 isolates of St thermophilus able to grow to heat-resisting pH 6.5 quickly and slowly pH 4.5 et 4.8, not producing a acetoine and not hydrolizing the esculine, ferment some differently sucres (43% fermented lactose and galactose, 20.6% have ferments the mélibiose, 18% have ferments raffinose and 14% have ferments the mélézitose).

Species of leuconostoc: The 29 isolate of leuconostoc are divided into 6 species: 7 of Ln.lactis, 5 of Weissella paramesenteroïdes (old Ln. Paramesenteroides) 7 stocks of Ln. amylibiosum, 7 of Ln mesenteroïdes subsp. cremoris, 4 deLn.mesentéroide subsp. dextranicum, et2 Ln. pseudomesenteroide.Une heterogeneity in the fermentation of sugars was noticed for isolates of 3 species S of leuconostoc:

- With a very high degree for Ln. mesenteroïdes subsp dextranicum (galactose = 32% mannose = 50%, raffinose = 56%, xylose = 75%, mélibiose = 45%, cellobiose = 55%).
- Follow-up of W paramesenteroïdes (galactose=50%, glucose = 50%, raffinose=66%, arabinose = 58%, xylose = 76%).
- With a less degree for Ln. lactis (mannose=72%, raffinose=38% and mélibiose=66%).

Species of pediococcus: Three species of Pediococcus were isolated. They form colonies smooth round grisâtres or blanchâtres on M17 medium. The microscopic observation in a fresh state between blade and plate reveals a form characteristic of cocci into tetrad. Among the 19 identified stocks 12 belong to l`espèce P.acidilactici, 4 with the P.damnosus species and 3 with the species P. Parvulus.

Species of lactobacillus: One hundard and twenty insulators of Pediococcus were classified in 11 species normally they are differentiated by their type of fermentation from the carbohydrates but the profile of the fermentation of its isolates was compared with those of stocks of references in the key of identification of

Bergey (Kandler and Weiss, 1986) and of the considerable differences were noted. By way of example: an isolate, identified as Lb. animalis differs from the stock of reference by the cellobiose fermentation, from the fructose and the galactose considered typical of the stock of reference. The isolates lactobacillus were subdivided in three groups:

Group of the thermophilous lactobacillus and homofermentaires strict: The isolates this group ferment hexoses exclusively by producing lactate but do not ferment produce lactate exclusively, but do not ferment pentoses. The associated species are:

- 01 isolate of Lb acidophilus which has a typical fermentation as for L stock of reference.
- 12 isolates of Lb.delbrueckii of which 7de Lb. delbrueckii subsp. bulgaricus (typical Fermentation) and 5 of Lb. delbrueckii subps lactis which ferments four carbohydrates in a different way (50% of the isolates fermented galactose and cellobiose, 44.4%ont ferments the melibiose and 22.2% have ferments the sorbitol).
- Twenty nine isolates of Lb.helveticus which ferment three differently carbohydrates (42% saccharoses, 42.8% the sorbitol and 42.9% fructose). Whereas the remainder of the carbohydrates were fermented either by 100% of the isolates or 0% of the isolates.
- 01 isolate of Lb animalis which does not ferment cellobiose, the fructose and galactose, fermentation considered typical for the pilot stock.

Group of the optional lactobacilles mésophiles and homofermentaires: The isolates D this group ferment hexoses exclusively by producing lactate and do not produce a gas starting from glucose. They can ferment pentoses. Three species belonging to this group were isolated:

- 58 isolates of Lb.casei including 20 isolates of Lb caseï subsp. caseï (typical fermentation), 10 of Lb. caseï. subsp. rhamnosus (typical fermentation) and of 10 of Lb. caseï. subsp. alactossus (typical fermentation).
- 30 isolates of Lb. plantarum (53.9% fermented saccharose, 53% raffinose and cellobiose and 46.6 fermented xylose). 01 isolate of Lb. amylophilus (typical fermentation).

Group of the strict lactobacillus mésophiles or thermophilous and hétérofermentaires: The isolates of group ferment hexoses out of lactate and/or ethanol and CO_2. One only isolated species was attached to Lb.brevis (20 isolates with 40% fermented the arabinose). This species like Lb. buchneri. Lb. fermentum and Lb. parabuchneri were insulated in milk and dairy products, as pays by Dellaglio *et al.* (1994). The species of lactobacilles hétérofermentaires isolated in the meats and incompetents to grow on acetate medium were introduced into the kind carnobacterium (Collins *et al.*, 1987). The search for production of gas starting from gluconate, noncarried out in more of the test of production of gas starting from glucose would undoubtedly have allowed us to classify the lactobacillus more easily insulated according to their type of fermentation (lactobacilles homofermentaires, lactobacilles hétérofermentaires optional and lactobacilles hétérofermentaires obligatory) as described by Demarigny *et al.* (1996). Generally the morphological analyses, physiological and biochemical showed a diversity of kinds and species isolated starting from milk believed from two population caprine local (Kabyle and Arabia) this composition from lactic bacteria is relative and depends on different the criterion used in each study as brought back by Fitzsimmons *et al.* (1999) and Bissonnette *et al.* (2000).

The identification of the isolates by the traditional methods presents much bus difficulties of the significant differences in the profiles of fermentation of sugars were observed. Consequently, the genotypic identification is essential to confirm phenotypical classification.

Distribution of the lactic bacteria

Distribution of the kinds: The distribution of the kinds in the two caprine populations seems to show that the Lactobacillus kind is definitely prevalent in the population Kabyle (61.48%); followed of Lactococcus (22.9%), Streptococcus (8.88%), Leuconostoc (5.92%) and by far Pediococcus (0.74%), whereas the two kinds Leuconostoc and Lactococcus are represented in an almost similar way in the population Arabia (32.64% and 31.02, respectively), like Lactobacillus (15.27%), Streptococcus (14.82%) and Pediococcus with a weak representation (6.25%).

The weak rate of the lactobacilles in the Arabia population, compared to the Kabyle population, seems to be with competitiveness "Lactobacilles/ Streptocoques" in the fermentation of the milk which is in favour of the streptocoques ones. This assumption was already advanced by Harrati (1974) which had noted their total absence in Algerian Lben. On the other hand, the prevalence of the lactobacilles recorded in the Kabyle population falls on enrichment by incubation with 30°C and 45°C until coagulation of the milk samples. The same remarks were announced by Tantaoui-Elaraki *et al.* (1983) and Tzantakis and Litopaulou-Tzanetaki (1992)

Table 4: Distribution of the species of BL isolated from believed milk of goat of two caprine populations

Espèce	%	n	A	K
Lb.delbrueckii subsp.bulgaricus	2.92	7	0	7
Lb.helveticus	12.03	29	8	21
Lb.plantarum	6.67	16	9	7
Lb.caseï subsp.rhamnosus	4.14	10	1	9
Lb.delbrueckii subsp.lactis	2.08	5	5	0
Lb.brevis	8.33	20	6	14
Lb.caseï subsp.alactosus	4.17	10	0	10
Lb.caseï subps. Caseï	8.33	20	5	15
Lb.acidophilus	0.42	1	1	0
Lb.animalis	0.42	1	1	0
Lb.amylophilus	0.42	1	1	0
Streptococcus thermophilus	9.58	23	11	22
Lc.lactis biovar diacetylactis	4.17	10	1	9
Lc.lactis subsp.lactis	5.83	14	6	8
Lc.lactis subsp.hordniae	1.67	4	0	4
Lc.lactis subsp cremoris	1.67	4	1	3
Lc.plantarum	5.42	13	10	3
Lc.garviae	0.83	2	0	2
Lc. raffinolactis	0.83	2	0	2
Leuconostoc lactis	2.92	7	5	2
Ln. mesenteroïdes subsp. cremoris	1.67	4	0	4
Weissella paramesenteroïdes	2.08	5	3	2
Ln.pseudomesenteroïdes	0.83	2	2	0
Ln. mesenteroïdes subsp. dextranicum	1.67	4	4	0
Ln.amylibiosum	2.92	7	7	0
Pediococcus damnosus	1.67	14	3	1
P.acidilactici	5	12	12	0
P. parvulus	1.25	3	3	0
		240	105	135
Total	99.77	(100)	(43.75)	(56.25)

A: the Arabia population. K: the population Kabyle.%: percentage of each species. N: total of the isolates in the species. [a]Pourcentage of the isolates in each population

or the prevalence of the lactobacilles is explained by their growth favorable to low pH. The rate high of the leuconostocs in the Arabia population but low in the Kabyle population is not easy to explain. However, for Sawaya *et al.* (1984), a relation exists between the composition in lactic bacteria, the composition of milk and the food. The pediocoques ones were not highlighted in the majority of the samples of milk and the number of isolates was always weak, even in the samples of the Arabia population. Resulted similar were brought back by Saidi *et al.* (2002) in the characterization of 206 isolates of BL starting from believed milk of the caprine population of the arid areas, or they showed a clear predominance of lactocoques (76.16%), Lc.lactis subsp.lactis. thus, Bekhouche *et al.* (1998) in the insulation of BL starting from cow's milk in the Algerian east or they showed a homogeneous distribution with a great frequency of Leuconostoc, follow-up of Lactobacillus, Pediococcus and Streptococcus. characterization of 206 isolates of BL starting from believed milk of the caprine population of the arid areas, or they showed a clear predominance of lactocoques (76.16%), Lc.lactis subsp.lactis. thus, Bekhouche *et al.* (1998) in the insulation of BL starting from cow's milk in the Algerian east or they showed a homogeneous distribution with a great frequency of Leuconostoc, follow-up of Lactobacillus, Pediococcus and Streptococcus.

Distribution of the species: The results of the distribution of the lactic bacteria according to the species are reported in Table 4. The number of species shows a low variability, about 19 and 22 at Arabia and Kabyle respectively. The species, PC acidolactci (12 isolates), Ln.amylibiosum (7 isolates)), Ln.mesenteroides subsp dextranicum (4 isolates), PC parvulus (3 isolates), Ln. pseudomesenteroides (2 isolates), Lb.acidophilus (01 isolates), Lb. amylophilus (01 isolates) and Lb animalis (01 isolates) are found only in the Arabia population. The species Lc garviae (2 isolates), Lc raffinolactis (2 isolats) ne are found that in the population kabyle. This distribution differs from one population to another as follows:

- In the Arabia population, the distribution of the other species is characterized by predominance from the species Lc plantarum (10 isolates), PC acidolacti (12 isolates), St thermophilus. (11 isolates) and Lb.plantarum (10 isolates).
- In the population Kabyle, the species Lb.helveticus (21 isolates), Lb casei subsp.casei (15 isolates), found in the other dominant populations.

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