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Microbial Evaluation of Milk and Milk Products During a Past Two Decades, in Basrah Southern Iraq, a Review

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Abstract:

During the past decades many researches have been done for investigation of milk and milk products microbiologically. Milk was found to be contaminated with several types of bacteria. Studies also shows that most bacteria have different antibiotic resistance patterned towered several known antibiotics. Investigation were done using different methods for investigation. Methods have been developed during this period from conventional biochemical test to using different molecular techniques for identification such as polymerase chain reaction or 16rDNA sequencing.

Key words: Basrah; Milk; cheese; antibiotics; genes.

Introduction:

Milk is one of the most important foods for human beings. It is universally recognized as a complete diet due to its essential components (1). Milk available is lower in food value due to high prevalence of mastitis in dairy animals (2). Milk is a major component in human diet all over the world, but it also serves as a good medium for growth of many microorganisms. Thus, the quality of milk is considered essential to the health and welfare of a community. Also, all cases of dairy illness continued to be of bacterial origin, pathogens that have involved in communicable diseases associated with the consumption of milk include *Salmonella* sp., *Listeria monocytogenes, Staphylococcus aureus, Campylobacter sp., Yersinia sp. (*3,4).

Milk normally has a varied micro flora arising from several sources, such as the exterior surfaces of the animal and the surfaces of milk handling equipment such as milking machines, pipeline, and containers (5). Therefore, milk is susceptible to contamination by many pathogenic microorganisms, which result in infection and threat to consumer's health. Additionally, there is the potential that the diseases of causative such as tuberculosis, brucellosis, typhoid, and listeriosis can be transmitted (6). Microbial load in fresh milk is although very low i.e. less than 10-3 CFU/L but this level may increase up to 100 fold if this milk is stored for many days at normal temperature(7).

Milk of buffaloes constituting an important source of market milk has some unusual qualities. The fat content can exceptionally be as high as 15 percent and the overall average may be 7 %. Milk is also an excellent medium for the growth of a large variety of bacteria.

Microorganisms are always undesirable in milk and its products. These are capable of causing deterioration in flavor, physical appearance of milk and transmission of infectious diseases to the consumers. The various organisms get into milk through unhygienic, carelessness and unsanitary practices of the farmers, processors and distributors. The important genera of bacteria normally found in milk are, *Microbacterium*, *Micrococcus*, *Streptococcus*, *Staphylococcus*, *Lactobacillus*, *Bacillus*, *Clostridium*,*Arthrobacter*, *Actinomyces*, *Coxiella*, *Pseudomonus*etc. (8). Most of these organisms are free living, widely distributed in soil, feeds, cows, buffaloes, goats, dairy utensils etc. Contamination usually occurs at the farm where milk is produced. *Escherichia coli* and coliform bacteria can enter milk and milk products very easily and their presence in the milk is an indication of contamination of milk. The presence of *E. coli* is the indicator of fecal contamination as well as it indicates the presence of toxigenic or enteropathogenic bacteria which are the major public health hazard. (9). *E. coli* frequently contaminates food and it is agood indicator of fecal pollution (10). Presence of *E.coli* in milk products indicates the presence of microorganisms, which constitute public health hazard. Enteropathogenic*E. coli* can causesevere diarrhea and vomiting in infants and youngchildren (11). Methicillin–resistant *Staphylococcus aureus* (MRSA) has become important acquired pathogen in hospital and also livestock(LA-MRSA) in recent years. MRSA associated with (LA-MRSA) have been reported worldwide in many species (12,13,14). MRSA produce a low affinity penicillin binding protein (PBP2 orPBP2a) in addition to the usual PBPs (15). Furthermore, MRSA strains are resistant to gentamicin, kanamycin, tobramycin, microldes, tetracycline and fluoroquinolones. Thus, multiple resistance of *S. aureus* strains occur (16,17,18).

Methods:

This study reviewed more than 30 papers and thesis that studied milk or milk products microbiologically in Basrah province. The period extended from about 17 years during past two decades. Most researchs were don in college of veterinary medicine, college of agriculture and college of sciences. Methodsused such as conventional biochemical testor using different molecular techniques for identification likeDNA extraction and polymerase chain reactionor 16rDNA sequencing.

The investigated subjects are type of animals, source of sample, microbes, antibiotic susceptibility and studied gene.

Results and discussion:

The most studied animals:

Different animals have been studied for collecting samples. The most of studies conducted on cows followed by buffaloes, sheep and goat. This may be because of availability of these animals and cows and buffaloes milk was a traditional used milk in Iraq. Camel milk have less attention during the mentioned period. This because it limited to the desert area. Many milk samples have been taken from market without specification of animals.

Raw milk has a good chance of investigation since it was easy to collect and deal at laboratory for investigation. In addition, milk was added without pasteurization in some cases for milk products (Table 1).

The commonly isolated bacteria:

Many studies have been concentrated on few species of bacteria that commonly caused a disease in both human and animals. *E. coli* and *Staphylococcus aureus* are the most studied organisms. This because of these species were the most common pathogens in this area. In addition to that *Salmonella, Brucella, Listeria monocytogenes*and others were also studied during this period. Yeast and molds took less attention. Table (2), shows the recorded organisms during investigated period.

Antimicrobial Susceptibility:

Most the studies involved in determine the antibiotic susceptibility of isolated microorganisms. Many microorganisms showed resistance to one or more antibiotics. common used antibiotics such as Tetracycline, cloxacillin, erythromycin, ampicillin, chloramphenicol, gentamycine and vancomycin were extensively used during the studies. Methicilline resistance also indicated for some *S. aureus* studies. (Table 3).

Studies genes and virulance factors:

Starting from year 2012 many studies involved in detection of virulence factors and genetic studies. Molecular level of investigation for microorganisms increase the chance of detection the small number of microbes in milk samples. Toxin genes and virulence genes studied because its importance to create a disease in both animals and human (Table 1&4).

Table 1. The most studied animal from were milk is collected

Animal	Sourece of isolation	Microorganism(s)	Studied genes or target	Studied Antibiotics	Reference
Cow	Milk	*Staphylococcus aureus*		Tetracycline, cloxacillin,	19

		,Streptococcusagalactia Streptococcus dysagalactia; Corynebacteriumpyogenes, E, coli,Klebsiella pneumonia ;Candida glabrata, Aspirgillusfumigatus Candida albicans, Sacchromycescerevisiae,Cryptococcu sneoformans.		erythromycin, ampicillin, chloramphenicol, cephalosporin	
Goat and buffalo	Milk	Hypersensitivity	Hypersensitivity	-	20
Markets	cheese , cream	*E. coli & S. aureus*	-	-	21
Buffalo and sheep	Milk	*Brucella*	-	streptomycin, gentamicin, rifampin, trimethoprim, sulfamethoxazole, kanamycin, tetracycline, doxycline, cephalexin, cefotaxim,ampicillin , erythromycin	22
Cow	Milk	*Staphylococcus aureus, Streptococcus spp, E. coli, Klebsiellaspp, Salmonella sp, Aspergillus spp, Candida spp*	-	Erythromycin, gentamycin, neomycin, chloramphenicol, kanamycin	23
Markets	Milk products	*Brucella*	-	streptomycin, gentamicin, rifampin,trimethoprim,sulfametho xazole, , kanamycin, tetracycline. doxycline,cephalexin, ,cefotaxim ,ampicillin , erythromycin	24
Cow	Milk, Chees	*Campylobacter* spp.	-	Erythromycin , Kanamycin, Metronidazole , Ampicillin , Ciprofloxacin and Gentamycin	25
Markets	Chees	*S. aureus*	-	Erythromycin, Clindamycin, ciprofloxacin, Tobramycin, penicillin , Vancomycin , Cloramphenicol,Nitrofurantion, Tetracyclin , Gentamycin	26
Markets	Milk product	*E. coli*	-	-	27
Cow	Milk	*Staphylococcus* Spp.	-	Gentamycin, Ampicillin ,PencillinOxacillin ,Novobiocen ,Chlormphenicol ,Ciprofloxacin, Gentamycine	28
Cow,goat	Milk	*Burkholderiapseudomallei*	Virulence factors		29
Animal ,markets	Milk & milk products	*Bacillus cereus*	Enterotoxin genes (*Sea-See*), cytK	Penicillin, neomycin, streptomycin , erythromycin , chloramphenicol , gentamycin , tetracycline	30
Animals	Milk	*E. coli*	-	Amoxicillin,Amikacin ,Gentamycin , Cefixime, Cephalothin,Ciprofoxacin,Cefoxi tin, Amoxicillin/Clavlanic acid, Naldicxic acid, Nitrofurantoin, Imipenim, Tetracycline , Azithromycin, Trimethoprim.	31
Cow	Milk	*E. coli*		-	32
Animals	Milk	*S. aureus*		-	33
cow	Milk	*Bacillus cereus*	Toxin emetic gene	Punicagranatum extract	34
cow	Milk	*Listeria monocytogenes*	-	Vancomycin ,Lincomycin, Cefotaxime, Sulfamethoxazol, MethoxNitrafurantin, Rifampicin ,Chloramphenicol,Erythromycin ,Cloxacillin, Tobramycin	35
Cow	(soft chees)	*E.coli*	*VT1, VT2, E. coli* O157:H7	-	36
Animal	Milk	*E. coli*	*Vt1, Pap, E coli*	Amoxicillin,amikacin ,gentamycin , cefoxitim ,ciprofloxacin.	37
Animal	Milk	*S. aureus*	*Enterotoxine*	-	38
Cow	Milk	*S. aureus*		ceftriaxone ,cefotaxime ,ampecillin,vancomycincarbencil lin,oxacillin, lincomycin ,pencillin gentamycin, erythromycin,doxycillin,tecoplan ine ,clindamycin ,ciprofloxacin ,nitrofurantoin, chloramphenicol, tobramycin , azithromycin	39
Animals	Milk,milk products	*Bacillus cereus*	*hbl, nhe*and*bceT*	-	40

Cow	Milk	*S. aureus*	*Coa*	-	41
cow	Milk	*E. coli*	*Tem* and *shv*	-	42
Camel	Milk	*E. coli*	Its	Amoxicillin/Clavulanic, Cephalothin, Cefixime, Cefoxitin,Amoxicillin, Trimethoprim, Azithromycin,Gentamycin, Imipenem, Amikacin	43
Camel	Milk	*E. coli*	Icd		44
market	Milk	*Salmonella*	*16srRNA*	Ampicillin,Amoxicillin, Azithromycin ,Ceftriaxone Chloramphenicol ,Ciprofloxacin ,Lincomycin, Rifampin Streptomycin,Trimthropin,Sulpha methoxide, Nalidixic acid, Vancomycin	45
Cow	Milk	Lactic acid Bacteria	each16s rRNA, *Nisin, enti A, enti B.*	-	46
Cow & market	Milk,yogurt, chees	Coliform, *E. coli*& lactic acid bacteria	-	-	47
Animals	White chees	*Bacillus cereus*	-	Erythromycin , Gentamycin , Tetracyclin, Streptomycin , Chloramphenicol , Cephalothin , Nalidixic acid Ampicillin Carbenicillin Sulfamethoxazole-trimethoprim .	48
Cow	Milk	*S. aureus*	Coa gene	Tobramycin , ciprofloxacin chloramphenicol , clindamycin oxacillin , vancomycin . erythromycin, gentamycin, nitrofurantoin, streptomycin, tetracycline, penicillin, cloxacillin,	49
Markets	Milk	*Bacterial count*	-	-	50
Cow, buffalo, sheep	Milk	*Listeria monocytogenes*	-	-	51

Table.2.Thepercentage of recorded organisms during investigated period.

Source	Product	Microbe	Percentage %
Market	Chees	*E coli*	62.66
market	Milk	*Salmonella*	6.1
Cow	Milk	*Lactobacilli*	51
Market	Milk	*Staphylococci*	15.55
Market	Milk product	Coliform	30 x 104cfu
Market	Milk, meat	*Campylobacter spp*	4-26
Cow milk Goat	Milk Milk	*Burkholderia* *Pseudomaleli*	33.33 26.66
Market	Milk, White chees	*Bacillus cereus*	30&20
Buffaloe	Milk	*Staphylococcus aureus*	22.2
Market	milk soft cheese curls cheese yogurt	*Bacillus cereus*	32.7 16.66 18.00 26.00
Cow, buffaloe, sheep	Milk	*Brucella spp.*	24.2
Market	Cheese,cream,ice-cream	*Brucella spp.*	8, 1, 0
Camel	Milk	*E. coli*	7.44
Market	soft cheese, curls cheese yoghurt local cream	*E. coli*	90×104-212×104 cfu 35×103-21×104 cfu 17×102-55×103 cfu 35×103-111×103)cfu
Market	Milk	*E. coli O157:H7*	13.7
Cow	Milk	*S. aureus*	48
Cow, buffaloe, sheep	Milk	*Listeria monocytogenes*	7.3
Market	Milk	*E. coli O157:H7*	57.34
Cow	Milk	*S. aureus*	53
cow , buffalo	Milk	*S. aureus*	30&27
Cow	Milk	*S. aureus*	48.61
Market	Chees	*S. aureus*	39
Market	Milk	*E. coli*	14
Cow	Milk	*Staphylococcus aureus* *Streptococcus spp* *E. coli,* *Klebsiellaspp,* *Salmonella sp* *Aspergillus spp,* *Candida spp*	33.12 24.84 12.88 1.84 0.92 20 80
Market	Milk & products	*Bacillus cereus*	12.9

Table 3. Antibiotic susceptibility of isolated microorganisms.

Microbe	Antibiotic	Susceptibility

E. coli	Gentamycin, Amikacin Amoxicillin, cefoxitim.	S R
Salmonella	chloramphenicol , rifampin ciprofloxacin	R S
Staphylococci	Ampicillin, Novbio. + Penicillin ,Oxcillin Ciprofloxacin, Chloramphenicol , Gentamycin	R S
Campylobacter spp	Kanamycin, Ampicillin, Erythromycin, Metronidazole Gentamycin, ceproflaxacin	R S
Bacillus cereus	carbencillin,cephalothin, ampicillin erythromycin, gentamycin, chloramphenicol, nalidixic sulfamethoxazole-trimethoprim.	R S S
Staphylococcus aureus	Cloxacillin	R
Bacillus cereus	neomycin,chloramphenicol,gentamycin,streptomycin erythromycin penicillin	S S R
E. coli	gentamycin,imipenem,andamikacin amoxicillin, trimethoprim, azithromycin,cefoxitin,amoxicillin/clavulanic , cephalothin, cefixime	S R R
E. coli O157:H7.	cephalothin ,cefoxitin ,cefixime, trimethoprim , amoxicillin, azithromycin, amoxicillin/clavulanic , ciprofloxacin, imepenim, nitrofurantoin, gentamycin , amikacin	R R S
Listeria mononcytogenes	Cefotaxine, sulfamethoxazol, chloramphenical, tobramycin Rifampicin	R S
S. aureus	nitrofurantoin, chloramphenicol, tobramycin azithromycin ceftriaxone, cefotaxime	R S

Table 4. Presence of gene(s) in investigated animals.

Microbe	**Genes**	**Presence**

E. coli	Vet 1, pap Vet2	+ -
Staphylococcus aureus	Coa	+
Bacillus cereus	cytK	+
Bacillus cereus	*hbl, ,,nhe* *bceT*	+ -
E. coli	Its	+
E. coli	Pai Icd	+ +
S aureus	Coa	+
E. coli O157:H7	Vt1 , Vt2	+
S aureus	Sec *Sea, Seb,Sed, See*	+ -
Escherichia coli O157:H7	Tem Shv	+ +
Bacillus cereus	Emetic toxine gene	+

Conclusion: The literatures of investigated period revealed that milk and milk product collected from different animals or from markets were highly contaminated with microbes. It is not clear whether these microbes were infectious to animal or the milk is contaminated during the transport or handling. Most investigate microorganism were *E. coli* and *Staphylococcus aureus* followed by *Salmonella, Brucella,* and*Listeria monocytogenes*.

References

1-Javaid, S. B.; Gadahi,J. A. K.; M. Bhutto; M. B. Kumbher S. and Panhwar, A. H. (2009). Physicaland chemical quality of market milk sold at Tandojam, Pakistan. *Pakistan Vet. J.*, 29(1): 27-31.

2-Allore, H.G., (1993). A review of the incidence of the mastitis buffaloes and cows. *Pakistan Vet. J., 13:1-7.and Fischer,* 232:67-76.

3-Adesiyun, A.A.; Webb L, and Rahman,S .(1995) Microbiological quality of raw cow's milk at collection centres in Trinidad. *J. Food Prot., 58: 139- 146.*

4-Hahn, G.(1996). Pathogenic bacteria of raw milk situation and significance. Proceedings bacteriological quality of raw milk, IDF, Brussels (Belgium), 13-15 March, pp: 67-83.

5-Burton, H. (1986). Microbiological aspects of pasteurized milk. *Bulletin of the International Dairy Federation, No. 200, Chapter III*. pp. 9–14.

6-Spreer, E. (1998). Milk and Dairy Product Technology. *Ed.MarcelDekker,Inc. NewYork, NY.*, pp.39.

7-Wells, J.G., Shipman, L.D., Gren, K.D., Sowers, E.G., Green, J.H., Cameron, D.N., Downers, P.P., Martin, M.L., Griffin, P.M., Ostroff, S.M., Potter, M.E., Tauxe, R.V., Wachsmuth, I.K., **1991.**Isolation of *Escherichia coli* serotypes 0157: H7 and other shiga-like toxin-producing *E. coli* from dairy cattle. *J. Clinical Microbiol*. vol. 29, pp985-988,.

8-Adesiyun ,A.A.(1994). Bacteriological quality associated public health risk of pre-processed bovine milk in Trinidad lnt. *J.Foodmicrobiol ., 21 :253-261* .

9-Aslam, M., Hogan, J., Smith, K.L.,(2003). Development of a PCR-based assay to detect shiga toxin producing *Escherichia coli*, *Listeria monocytogenes* and Salmonella in milk, *J FoodMicrobiol. vol. 20, pp345-350.*

10-Soomro, A.H.;Arain, M.A.; Khaskheli, M. and Bhutto, B. (2002). Isolatio of *Escherichia coli* from raw milk and milk products inrelation to public health sold under market condition at Tandojam. Pak. *J. Nutr., 13, 151–152.*

11-Anonymous, *E. coli* enteritis. Lancet, 1975, 1131–1132.

12-Persoons, D.; van Hoorebeke, S.; Hermans, K.; Butaye, P.; de Kruif, A.; Haesebrouck, F.; *et al*. (2009). Methicillin-resistant *Staphylococcus aureus* in poultry. Emerg. Infect. Dis. 15:452-453.

13- de Neeling, A. J.; van den Broek, M. J.; Spalburg, E. C.; van Santen-Verheuvel, M. G.; Dam-Deisz, W. D.; Boshuizen, H. C.; van de Giessen, A.W.; van Duijkeren, E. and Huijsdens, X. W. (2007). High prevalence of methicillin resistant *Staphylococcus aureus* in pigs. Vet. Microbiol. 122:366-372.

14-Smith, T. C; Male, M. J.; Harper, A. L.; Kroeger, J. S.; Tinkler,G.P.; Moritz, E.D.; *et al*. (2008). Methicillin-resistant *Staphylococcusaureus* strain ST398 is present in Midwestern U.S. swine and swineworkers. PLoS One. 4:4258.

15- Hartman, B., andTomasz. A. 1984. Low-affinity penicillinbinding protein associated with beta-lactam resistance *Staphylococcus aureus*. *J. Bacteriol. **158:**513–516.*

16-Chambers, H. F. (1997). Methicillin resistance staphylococci; molecular and biochemical basis clinical implications. Clin. Microbiol. Rev. 781-791.

17-Petinaki, E.; Miriagou, V.; Tzouvelekis, Ls.; Pounaras, S.; Hatzi, F.; Kontos, F.; Maniati, M. and Maniatis, A. N. (2001). Bacterial Resistance Study Group of Thessaly. International Journal of Antimicrobial Agents. 18: 61-65.

18-Maddox, C.W.(2011). Transfer of methicillin resistance and virulence factors between staphylococci. AAVL Bacteriology /Mycology Sub-committee Mini-Symposium. Sponsorship generously provided by: Biolog.Inc. and Pfizer Animal Health. New York, USA.

19-Abdulla, F.;Khudor, M.H. and Muhsen ,R . K. (2002). Microbiological Study of Subclinical Mastitis of Cows in Basrah City. *Al-eadisiya J. Of Vet. Med. Sci.* ,1 (2).

20-Faaz*et al*. (2006). The Role of Goat and buffalo's Milk Allergens. *Bas. J.Vet. Res.* , 5: 77.

21-Othman, R. M.; Abdul Alwahid, A. T. And Japer, N. N. (2008). The Microbiological Quality Of Some Raw Milk Products.*Bas.J.vet.Res.*,7(1):35.

22-Abbas, B.A. And Aldeewan ,A. B. (2009). Occurrence and epidemiology of *Brucella* Spp. in raw milk samples at Basrah Province, Iraq. *Bulgarian Journal of Veterinary Medicine*, 12(2) : 136−142.

23-Lyli, A.; E. Abdul Wadoodand A.Y.Jassim(2009). Isolation and identification of some species of microbes from cows milk and their sensitivity for antibiotics at Basra province.*AL-QadisiyahJournal* of *Veterinary Medicine*Science, 8(1):41.

24-Majeed, K.R. And Abdul Hussain, R. (2011). Patterns Frequencies Of Campylobacter Spp. Isolated From Food In Basrah Province And Its Sensitive To Antibiotics. *Basrah .J.Agric.Sci.*, 24 (1):141.

25-Abbas, B.A. And Talei, A. B. (2010). Isolation, Identification andBiotyping of*Brucella* spp. from Milk Product at Basrah Province.*Bas.J.vet.Res.*,9(1):152.

26-Japer, N. N. (2011). Isolation andBiotyping of*Staphylococcus aureus* from White Cheese In Basrah Local Markets. *Bas. J. Vet. Res.,* 11(2):55.

27-Al-kuzayi, A.K.N. And Al-Sahlany, S.T.G.(2011). Detecting For*E. Coli* O157:H7 In Dairy Products Which Were Locally Processed and Found In Basra City Markets. *Basrah J. Agric. Sci.,* 24(1):290.

28-AL-Edany, A.A. ;Khudor, M.H. andAL-Mousawi, K. S. (2012). Comparison Of Three Indirect Tests For The Diagnosis Of Bovine Subclinical Mastitis Caused By Coagulase Negative Staphylococci With Their Susceptibility To Seven Antibiotics.*Bas.J.vet.Res.*,11(1):74.

29-AL-Rodhan, A. M. and Ibrahim, H. K. (2012). Isolation And Identification Of BurkholderiaPseudomallei From Cows ,Goat's Milk And Their Surrounding Environment In Basrah Province.*Bas.J.vet.Res.*,11(2):145.

30-Khudor, M.H.; Abbas, B.A. andSaeed, B.M. S. (2012). Molecular Detection Of Enterotoxin (Cyt K) Gene And Antimicrobial Susceptibility of Bacillus cereus Isolates From Milk And Milk Products**.***Bas.J.vet.Res.*,11(1):164.

31-Khudaier ,B.Y.; Abbas, B.A. And Khleel, K.A.(2012). Prevalence andAntimicribial Susceptibility of*Escherichia Coli* O157:H7 Isolated From Human and Animal Sources In Basrah Province. *Bas. J. Vet. Res.,* 11(2):47.

32-Abbas, B.A.;Khudor, M.H.AndAbidSmeasem, O.I. (2012)a. Detection of Verotoxigenic *E. coli* O157:H7 in Raw milk Using Duplex PCR in Basrah City- Iraq . *MRVSA.*,1(1): 25-33.

33-Khudor, M.H. ; Abbas, B.A. andIdbeis, H.I. (2012). Detection Of Enterotoxin Genes Of *Staphylococcus aureus* Isolates From Raw Milk . *Bas. J. Vet. Res.,* 11(1):254.

34-Abbas, B.A.;Khudor, M.H.andd Saeed, B.M. S. (2012)b. Molecular Detection Of *Bacillus cereus* Emetic Toxin Gene By PCR And Determine Its Susceptibility Against PunicaGranatum Extracts. *Bas. J. Vet. Res.,* 11(4):79.

35-Abbas, B.A. And Jaber, G. M. (2012). Occurrence of Listeria *monocytogens* in raw milk of ruminants in Basrah province. *Iraqi Journal of Veterinary Sciences,* 26(1):47-51

36-Abbas, B.A.;Khudor, M.H. andAbidSmeasem, O.I. (2013). Detection Of Vt1 And Vt2 Genes In *E. Coli* O157:H7 Isolated From Soft Cheese In Basrah, Iraq Using Duplex PCR .*Journal of University of Zakho* **,**1(1)**:**58-64.

37-Abbas, B.A. (2013). Detection of Virulence and Adherence gene In *Escherichia Coli* O157:H7 isolated from animal products.*Bas.J.vet.Res.*,12(2):59.

38-Abbas B. A. ;Khudor, M.H. andIdbeis, H.I. (2013). Iinvestigation of the activity and pathogenecity of *Staphylococcus aureus* enterotoxin c by ligated ileal loop assay in rabbits. Bas.j.vet.Res. 12,.2,(2):104.

39-Khudaier ,B.Y.; Abbas, B.A. and Khudaier,A.M.(2013). Detection of Methicillin Resistant *Staphylococcus aureus*Isolated from Human and Animals in Basrah Province / Iraq**.**MRVSA , 2(3):12-21.

40-Abbas, B.A.;Khudor, M.H. And Saeed, B.M. S. (2014)c. Detection Of *Hbl*, *Nhe*And*Bcet*Toxin Genes In *Bacillus cereus* Isolates By Multiplex PCR.*Int. J. Curr. Microbiol. App. Sci*., 3(11): 1009-1016**.**

41-Abbas, B.A.;Khudor, M.H. andHanoon, B. M.(2014)b. Isolation And Identification Of *Staphylococcus Aureus* From Bovine And The Detection Of Its Coagulase Gene (*Coa*) Using Polymerase Chain Reaction (PCR).*Sc. Res. Assays.*, 9(20):864-868.

42-Abbas, B.A. ;Khudaier,B.Y. and Khleel, K.A.(2014)a. Molecular detection of β-lactamase (*tem* and *shv*) genes in *Escherichia coli* O157:H7 isolated from different sources in Basra, Iraq. *Journal of Advanced Biomedical & Pathobiology Research*, 4 (4): 1-101.

43-Abbas, B.A. ;Khudaier ,B.Y. andAnad, I.T. (2015)a. Antibiotic Resistance Pattern of *Escherichia coli* Isolated from camel Milk and Detection the Presence of its Gene. Special issue of Scientific and Practical Journal Veterinariya #2 (42):220. Proceedings of 4th conference of ISOCARD «Silk Road Camel: Main Stake For Sustainable Development". June 8-12, 2015Almaty, Kazakhstan.

44-Abbas,B.A.;Khudaier,B.Y. andAnad, I.T.(2015)b.Sequencing of icd gene of *Escherichia coli* isolated from camel Milk. Special issue of Scientific and Practical Journal Veterinariya #2 (42):416. Proceedings of 4th conference of ISOCARD «Silk Road Camel: Main Stake For Sustainable Development". June 8-12, 2015Almaty, Kazakhstan.

45-Mohammed, M.M. andKhudor, M.H. (2016). Serological, Molecular Characterized And Plasmid Mediated Antibiotics Resistant Patterns Of Salmonella Spp. From Milk And Other Sources.*Bas.J.vet.Res.*,15(3):155.

46-R., Hibbat Al Rahman, and Abdullah, F. A. (2016). Phenotypic And Genotypic Identification of Bacteriocin Producer Lactic Acid Bacteria Isolated From Cows Milk.*Bas.j.vet.Res.*15(3):446.

47-Alhelfi, N.A. (2016). Assessment of the Efficiency of Petrifim Method in Study of Bacteriological Quality of Some Homemade Dairy Products in Local Market of Basra.*Food Science and Quality Management* , 54:39.

48-Al-Hadithi, H. T. And Ali, E. K. (2016). Incidence Of*Bacillus cereus* In Food And Environmental Sources In Basrah / Iraq. Antibiotic Resistance Profiles Of Recovered Isolates.*Int. J. Curr. Res. Aca. Rev.*, 4(10): 117-127.

49-Abbas, B.A.;Khudor, M.H. andHanoon, B. (2016). The Relationship Between Biotype,Serotype, Antibiotic Susceptibility And Coa Gene Polymorphism In *Staphylococcus aureus* Isolated From Bovine.*Vet. Med., Assiut Univ., Egypt*,17:33.

50-AL-Edany, A.A. and Ghazi ,S. S. (2016). Evaluation of Raw Milk from Local Markets and Milk Samples Taken Directly From Cows in Basrah-Iraq.*IOSR Journal of Agriculture and Veterinary Science*.,9(12):59-64.

51-Niamah, A. K. (2012), Detection of *Listeria monocytogenes* Bacteria in Four Types of Milk Using PCR. Pakistani Journal of Nutrition, 11:**1158-1160**

52-Khaleel, D. A.; Othman, R. M. And Khudaier ,B.Y. Isolation and Identification of *Staphylococcus aureus* from Buffaloes Milk With Subclinical Mastitis and Milk Workers.Bas.J.Vet.Res. 15(2):304.

53-Smith, T. C; Male, M. J.; Harper, A. L.; Kroeger, J. S.; Tinkler, G.P.; Moritz, E.D.; *et al*. (2008). Methicillin-resistant *Staphylococcus aureus* strain ST398 is present in Midwestern U.S. swine and swine workers. PLoS One. 4:4258.