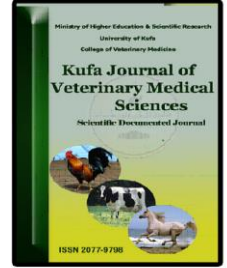




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Detection of Salmonella Spp. in milk samples of selected regions of Diyala city

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Abstract:

The aim of this study was to identify milk contamination that produced from dairy cattle with salmonella organisms in different regions of Diyala city. Fresh (unpasteurized) and heat treated (pasteurized) milk samples (n=10) were collected randomly from non-similar five regions of Diyala city that well-known with dairy cattle production particularly local shops and cattle shepherd markets, samples were send to the laboratory for some microbial testing. Special selective media were prepared and cultured with pasteurized and raw unpasteurized milk, the results refered that there were infected milk samples out of 10 fresh unpasteurized milk as the following percentage, 10% Rashdiah, 20% Bani saad, 80% Ghalbiah, 50% Khalis and 20 % Shiftah, while the pasteurized milk samples displayed contamination out of 10 samples as the previous (20% Rashdiah and 10% Ghalbiah), other pasteurized samples regions showed negative results for salmonella in regions of Bani saad, Khalis and Shiftah. We concluded that both heat treated and fresh milk may be unsafe for humankind ingesting if produced under unsanitary conditions or insufficient pasteurization.

Key words: salmonella spp., cattle raw milk, pasteurization.

الكشف عن تلوث حليب الابقار بجرثومة السالمونيلا المرضية في مناطق مختلفة من محافظة ديالى

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الخلاصة:

استهدفت هذه الدراسة التحري عن تلوث حليب الابقار الخام والمبستر بجرثائم السالمونيلا المرضية في مناطق مختلفة من محافظة ديالى (الراشدية، بني سعد، الغالبية، الخالص وشفقة) تم جمع عينات الحليب عشوائيا بواقع 10 عينات من كل منطقة من الحليب الخام الغير مبستر و10 عينات من الحليب المبستر مسبقا اعتمادا على قول البائع. اخذت العينات مبرده الى المختبر وتم زراعتها على وسط زرعي خاص بجرثائم السالمونيلا وخضعت لبعض الفحوصات المايكروبية، اظهرت النتائج هناك تلوث حليب الابقار بجرثومة السالمونيلا في عينات الحليب الخام غير المبستر في المناطق (الراشدية 10%، بني سعد 20%، الغالبية 80%، الخالص 50% وشفقة 20%)، في حين نتائج تلوث حليب الابقار المبستر بجرثائم السالمونيلا كانت (الراشدية 20% والغالبية 10%) اما مناطق (بني سعد، الخالص وشفقة) حيث لم يظهر فيها تلوث. يستنتج من هذه الدراسة ان

التلوث في الحليب الخام الغير مبستر قد نتج عن عدم توفر الشروط الصحية عند انتج الحليب او قد تكون الابقار حاملة لجراثومة السالمونيلا. كذلك ظهور تلوث في عينات الحليب المبسترنسبة ضئيلة ربما يكون السبب هو عدم كفاءة العملية بمجملها او قد يكون هنالك تلوث ما قد حصل بعد عملية البسترة.

Introduction:

We hear greatly these years about food worried, further than 200 recognized diseases are spread through foodstuff via a various mediators that include bacteria, viruses, fungi, as well parasites. Depending on public healthcare and foodstuff security consultants, every year large numbers of sicknesses in the world related to the food origin pathogens.

Whereas, the Center for Disease Control and Prevention of the United States (CDC, 2003 & CDC, 2004) evaluates that 76 million person's get infection, further than 300,000 are hospitalized, and 5,000 Americans suffers from foodborne disorder. Salmonella organisms cause many pathogenic infections in humans, salmonella also has a vital role in outputting toxins that leads to food poisoning, as well represents as main reservoir for foods like poultry meat, meat products, milk, milk products and eggs.

Milk, as a natural liquefied food, is one of our best nutritionally complete nutrients, adds high-quality protein, milk sugar, fat, vitamins, and essential minerals to the diet. Conversely, milk contains bacteria that when wrongly handled may create a conditions where bacteria could multiply. Most of the microorganisms in fresh milk of a healthy animal are harmless and beneficial. But, in case of any deviations in the healthiness of an animal, or the milk handler, or contaminants from manure, polluted water, dirt, rodents, mosquitoes, air and wounds can make raw milk possibly unsafe (Smith, 1981). The main difference between pasteurized and fresh or raw milk is the fact that

the heat treatment throughout pasteurization destroys pathogenic microorganisms that may have entered the raw milk as pronounced previously, pasteurized milk can be contaminated through direct handling, bottling, consignment, and storage.

Pasteurization breakdowns down the pathogens in the milk throughout processing, if there were unsanitary conditions allows pathogens to re-enter the milk consequentially, it will be contaminated again (Van Kessel et al. (2004).

Early previous century milk products were a reason about one out of each four outbreaks due to water or food contamination in the United States (Weisbecker, 2007). As initiate the 21 century in this country, dairy products cause the lowest outbreaks of all the major food sorts as milk, beef, eggs, poultry, seafood (CSPI, 2008).

The new review of the literature on food source pathogens was published by Oliver et al (2009), it was summarized as follows:

(Campylobacter: 2 – 9.2%) (E. coli O157:H7: 0 - 0.75%) (Salmonella spp: 0–11%) (Listeria monocytogenes: 2.8–7.0%) (Yersinia enterocolitica: 1.2–6.1%) (Shiga-toxin E. coli: 2.4–3.96%) (Staphylococcus aureus 3.2%).

Salmonellosis is the greatest public disease transferred in fresh milk and other food caused by salmonella organism which is a coliform gram negative bacteria, it is main causes of food toxicity in human also it is shed in the fecal materials of the cattle and may picked up on the animals' hair or teats. The infection source is commonly via feces of infected cows, aerosol dust transmission in

confinement facilities, nasal secretions, saliva particularly in shared water, milk, colostrum in addition to transporter animals. Other sources of infection may be birds, rodents, flies, dogs, cats, raccoons and people. Cattle chronically carriers may shed 100 to 108 salmonella cell per day with feces and 102 to 105 per ml of milk (Sheila, et.al, 2003). Numerous strains of salmonella can cause food related disorders in humans, and all strains show the same symptoms such a gastroenteritis particularly diarrhea and vomiting (Smith, 1981).

The origin of milk pathogenic bacteria in the dairy environment can be from purulent excretion of the infected mammary gland of an infested animal, or through direct contact with contaminated things in the pasture environment. Besides, dairy cattle may ingest water or feed that has been contaminated with feces from animals shedding the organism (Sheila, et.al, 2003).

Most food sources pathogens live the ruminant gastro-intestinal tract, and thus, dairy cattle are considered a major depository of salmonella, also, milk contamination with foodborne pathogenic bacteria during unhealthy industrial processes which are represent an important risk of post-pasteurization contamination that could lead to exposure of the consumer to pathogenic bacteria (Arizcun et al., 1998; Roberts and Wiedmann, 2003; Wong, 1998). Milk from healthy cows is commonly sterile when it exits the mammary gland, but several authors have resulted that after milk collecting, bulk tank of fresh raw milk from multiple cows mixed and stored in a container which have a high chance of contamination (Hancock et al 1998; Jayarao et al, 2006).

Salmonellosis has a wide range appearance disease in cattle, in general clinical signs are asymptomatic mild clinical or fulminated septicemia and toxemic infections can occur. The signs differ with virulence of the strain, dose of infection, and immunity of the animal. On many dairies, it is difficult to distinguish which cows are shedding salmonella due to subclinical and asymptomatic carrier that shedding many organisms in their manure (Sheila, et.al, 2003).

The aims of this study were to discover the public health related contamination of fresh non pasteurized and pasteurized milk with salmonella organisms of different areas of Diyala city.

Materials and methods:

fresh raw and pasteurized milk samples were obtained randomly through dairy shops, groceries and stores from several selected regions of Diyala city (bani saad, shifta, rashdiah, ghalbiah, khalis), that have high concentration of dairy cattle production, milk sample were kept in a sterile specific clean containers under 4 c° refrigerator, diluted with peptone water as pre-enrichment stage and selective stage on selenite broth.

Milk samples from labled containers were spread onto specific differential highly selective solid media for salmonella and shigella growing agar (s.s.agar), all dishes were cultured then incubated at 37 C° for 24 hr., smear of developing colonies were stained with gram stain (Tom et. al., 2008).

All positive samples were undergone to the biochemical tests (phenyl alanine, indol and simon citrate. Following incubation, color and location of colonies on the plate were recorded. Microscopic view of stained smear showed gram negative bacteria as well as infected samples with

salmonella displayed dark black or black centered, flat with transparent

borders colonies (Downes, 2001).

Results:

Results presented according to the following table:

region	Fresh raw Samples	positive for Salmonella	percentage
Rashdiyah	10	1	10%
Bani saad	=	2	20%
Ghalbiah	=	8	80%
Khalis	=	5	50%
Shiftah	=	2	20%

Table (1) show positive results of raw milk sample

region	Pasteurized samples	Positive for Salmonella	percentage
Rashdiyah	10	2	20%
Bani saad	=	0	-
Ghalbiah	=	1	10%
Khalis	=	0	-
Shiftah	=	0	-

Table (2) show positive results of pasteurized milk sample

Discussion:

Salmonella organisms cause food contamination, enters the intestine of animals and human through mouth leads to infection and digestive disorder. Table (1) showed there are infection of all samples of raw non-pasteurized milk, that's mean there were absent of sanitary condition of milk during milking, handling and storage. In addition, milk pasteurization more safety for human consumption, the sources of milk infection in this study may be result from dirty milk handler or milk machine which allows salmonella organisms to contaminate or due to re-contamination of milk containers and tools, also may there were salmonella mastitis of the cows which yield milk (Olsen, 2004 and Tondo et al. 2000).

Table (2) displayed there were negative results of the Bani saad, Khalis and Shiftah. In spite of the milk were pasteurized, the results of

samples which obtained from Rashdiah and Ghalbiah showed positive reaction, pasteurization breakdown pathogens of the contaminated milk at the time of heat handling, unsanitary conditions permits pathogens to re-enter the milk and may be contaminated again. Besides, pasteurization equipment could be insufficient or there were raw milk in the product sold as pasteurized milk, this can occur if the heating is inadequate, or if the milk is not heated for long time (Hegarty et al., 2002 and CDC, 1984).

It was concluded that each fresh raw and pasteurized dairy products can be hazardous if manufactured under insanitary environments. This study shows that pasteurization is not represent the final key for the control of milk pathogens.

Conclusions:

It was concluded that consumers must balance different factors when

selecting the most dairy product, the outcomes of the current study obviously showed that bacterial quality and security of raw milk was insufficient. The existent of salmonella organisms means that there was poor environmental hygiene. In addition that pathogenic bacterium such as salmonella may persist alive in the milk due to insufficient pasteurization temperatures.

In recommend that strong cleaning of milk container because it contains several types of pathogenic bacteria that cause human illnesses. In addition, dairy manufacturing should be worried around foodstuff protection because of pasteurization may not breakups all pathogenic organisms in milk, as well as adequate pasteurization suggested.

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