Contamination of the local produced broilers carcasses with *Escherichia coli* O157:H7 and its effect in public health in Diyala province

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Received: 7/4/2015

Accepted: 6/9/2017

Summary

The study was conducted to indicate the contamination of the local produced broilers carcasses by *Escherichia coli* O157:H7, and its effects on public health. Sixty samples of local produced Broilers were collected randomly from five different areas in Baquba center of Diyala governorate, (Iraq). Thirty samples to each were collected in summer, from the beginning of July to end of August, and in winter season from the beginning of December to end of January to investigate their microbial load. All summer samples had significantly ($P<0.05$) higher microbial count of Coli-form Bacteria, *Escherichia coli* and *E.coli* O157:H7 than winter samples, but there were no significant differences in the mean values of *Escherichia coli* count CFU/g, and *E.coli* O157:H7 count between summer and winter seasons. The conclusion of study showed that the contamination of local produced broilers by these bacteria was higher through summer as compared to winter season; the reason is because of temperature in summer which leads to growth and Proliferation of these bacteria and misuse of preparation and production of meat acts to increase the microbial load in these products.

Keywords: Broilers, *Escherichia coli*, Media, Heat stress, Antibiotics.

Introduction

In the various countries of the world, Zoonotic diseases among humans and animals become widely scattered. Animal products are an important reason for the transmission of these diseases to humans, but the local product of chicken meat have a particularly significant role in the transmission of many pathogens to humans, due to a higher payload germ resulting from non-use of thermal treatment sufficient to eliminate pathogenic bacteria located in it as well as the pollution due to the primitive methods used during slaughter, transportation and trading. The application of the health measures and conditions would lead to the elimination of pathological bacteria that exist within it and to the reduction of microbial load that have a significant role in the quality and prolong its Shelf-Life for human consumption (1-4). In Iraq, the estimated annual incidence rate of default *E.coli* O157:H7 stands at 6, 810, considering that the population 25, 374 and 691 people (5 and 6). *E.coli* Isolated for the first time from the feces of children sampled in Germany in (1885) by (Theodor Von Escherich), While (Lareull) had first postulated its Pathogenesis in (1889); *E.coli* is the most important race of coli-form non relatively nurse or nurse opportunistic and it exists naturally in human and animal warm-blooded colon, and preparing unhealthy products of poultry meat and inefficient thermal treatment and pollution-winning post-production to make the cause spread (7 and 8).

There are strains of *E.coli* serotype (O157:H7) product of the toxin infection by drinking contaminated water or the consumption of contaminated meat untreated thermally. Infection of this strain was known for the first time in 1982 in the states of Michigan and Oregon in America, and it was as the biggest pathogenic infection recorded in 1996 in Japan (9). In recent time in various countries around the world, an increase occurred in the incidence of these bacteria as a result of this transition through a number of vectors contaminated food with this pathogen (10 and 11). Most reactions *E.coli* O157:H7 pattern is ideal and this pattern differs from other styles being older produce toxins (Verotoxin) and effects of pathogenic cells and natural Vero College of green monkeys, also

called Shiga-like Toxin (SLT) and include toxin (SLT1) and (SLT2) (12).

Studies reported that the incidence and deaths associated with *E.coli* O157:H7 bacteria is focus on them through the impact of the disease, toxin-producing as well as the clinical symptoms, found that all ages of both sexes are susceptible to newly infected with this bacteria but children, the elderly and persons with low level of immune system are most susceptible (10 and 13). International health organizations deemed human infection with this pathogen as having health and economic importance for being a top cause severe or serious medical complications or both intestinal injury (14). It occurs when eat food contaminated with the result of the presence of the bacteria itself or because of the presence of toxins produced by show of infection within hours and up to days (15). Through studies and reports issued by the FDA and CDCs, it shows that the incidence of annual infection with *E. coli* O157:H7 germs be high, but the seriousness of the injury and the death rate is low (which is 0.94 deaths/100 cases) compared to other germs the incidence of infection is low, but the high rate of death (16). The aim of the study was to evaluate contamination of the local product broiler can causes by *E. coli* O157:H7 and its effect in public health.

Materials and Methods

The Total Count of *E.coli* O157:H7: Standard plate count (SPC) method, Taking 11 grams of sample to be tested (parts of the chest and thigh), put in a blender and add 99 ml of a 2% solution of sodium citrate, 45°C temperature and mix on high speed 3000 r/min for 5 minutes, conducted on the sample string of decimal dilutions, and used two dishes to relieve one, and the transfer of (1) and (0.1) ml of the diluted to each dish and was attended by central VRB to calculate coliform attended the center Cefixim Tellurite (CT), Sorbitol MacConky (SMAc) poured in dilutions sample dishes , planting 1 ml of the diluted it, and put incubator at a temperature of 37°C for 24 hours for the purpose of isolating and expense of preparing the bacteria *Escherichia coli* and *E.coli* O157:H7. the growth of *E.coli* in the form of colonies of pink color to red while *E.coli* is to sorbitol non fermented, which including serotype O157:H7, if any, will grow in the form of colonies colorless to almost gray, smooth with a hazy center and diameter (1-2) mm. pick dish a decimal mitigation optimization, which range from the preparation of the developing colonies where diagnosed scrupulous between (15-150) colony, and calculated to prepare the college colonies overall average and hit the inverted dilution for the number of (colonies/g) of sample CFU/g.

The Confirmatory Test: Ideal choice colonies planted on the Nutrient Agar (N.A) and incubated for 24 hours at a temperature of 37°C, action methods of profiling serum (Serotyping) using the slid agglutination test as checking for confirmatory diagnosis germs *E.coli* serotype O157:H7 availability of anti qualitative serum antigen, the Somatic (O157) and Flagellate antigen (H7) for this serotype. Using several special for this worshiper Oxoide @ pattern Latex O157 Serotyping Kits, which include four reagents, namely: (Control +Ve, Control -Ve, O157 test latex, O157 Control latex) According to the result of positive to possess germ isolation of (O157) Somatic antigen condition of the emergence of agglutination with the reagent control is located (12 and 17-20).

The results were analyzed by the statistical methods used in accordance with the analysis of variance (ANOVA).

Results and Discussion

Through the (Tables, 1 and 2) it is shown that the overall rate of the number of the presence of *E.coli* O157:H7 (CFU/g) ratios was 50%, thus there is a rise in the overall rate in those products when compared to the number of positive samples to the total number of samples and the proportions of the insulation and the rates of the total count of bacteria *E.coli* O157:H7 summer and winter seasons. Also, it is observed that all these samples were of a low level in terms of health, quality and non-matching domestic and international standards especially the European Union directives (16) in which states that Total Bacterial Count (TBC) must not increases for (10^5 bacteria/ml).

Table, 1: Bacterial isolation (*E.coli*O157:H7/g) of samples during the probationary period .

Month	No. of (+) samples/ Total No.	Isolation percent %	TBC rate *E.coli* O157:H7 CFU/g
July	٩/١٥	٦٠	١٠^٦× 2.7
Augest	٨/١٥	٥٣,٣	١٠^٦× 3.2
(July+Augest)	17/30	56.66	١٠^٦× 2.95
December	٧/١٥	٤٦,٦	١٠^٥× 7.5
January	٦/١٥	٤٠	١٠^٥× 6.8
(December+January)	13/30	43.33	١٠^٥× 7.15
Total	٣٠/٦٠	٥٠	١٠^٥× ٥,٠٥

The results of both of (Table, 1 and 2) confirm the effect of the year seasons on the TBC of (*E.coli* O157:H7), where the results of (Table, 3) showed a significant difference (P<0.05) in the TBC rates (CFU/g) of the summer season for the winter season, and this is consistent with (6 and 10). This significant high rate in the (TBC) of summer season was attributed to many reasons, including the appropriate degree air to the growth and reproduction of these germs heat especially in Iraq. The respect to the misapplication of health law at slaughter, production, marketing and supply in addition to the rapid multiplication of bacteria in these products when they become the temperature close to the optimum for their growth during the summer season, where exposed to conditions of freezing and thawing repeatedly because of a power outage during storage in addition to survival for long periods in the retail and not consumed shortly by the consumer exposing them to these conditions and for longer periods and all of these reasons, found on the ground in Iraq. A record the presence of a significant difference (P<0.05) in the total count rates of coli-form (CFU/g) of the summer season for the winter season, while there was no significant difference in the high rates in the counting of *E.coli* and germs *E.coli* O157:H7 (CFU/g) during the two seasons. This is due to continue in the high count to many reasons in addition to the reasons advanced above, the inefficiency of thermal treatment and poor conditions of production and pollution make the reason for the spread of the high number of food where it came from is also identical with (10). It conclude from the study that the total count of bacteria mentioned rate above is high during the summer season compared to the winter season due to favorable environmental conditions, especially temperature assistance to the growth and reproduction of bacteria during the summer season, as well as other negative reasons such as preparation and production thermal and transactions and factors of pollution, and storage.

Table, 2: Isolation ratio and the rate of TBC of (*E.coli* O157:H7/g) in stores popular areas.

Popular areas No.	No. of (+) samples/ Total No. Summer season	No. of (+) samples/ Total No. Winter season	No. of (+) samples/ Total No. samples	Isolation percent %	TBC rate *E.coli* O157:H7 CFU/g
١	٤/٦	٣/٦	7 / 12	34	١٠^٦× 1.4
٢	٤/٦	٣/٦	7 / 12	34	١٠^٥× 1.8
٣	٢/٦	٢/٦	4 / 12	32	١٠^٦× 3.7
٤	٤/٦	٢/٦	6 / 12	50	١٠^٥× 4.2
٥	٣/٦	٣/٦	6 / 12	50	١٠^٦× 4.2
Total	١٧/٣٠	١٣/٣٠	٣٠ /60	50	١٠^٥× 5.05

Table, 3: Samples TBC compared rates for both summer and winter season.

CFU	Summer season TBC±SE	Winter season TBC±SE	significant level
TBC	±١٠^٧×١٢,٠٨٣ -١٠^٧×١,٨٠ ١٠^٧×٠,٠٨٦	±١٠^٧×٩,٥-١٠^٧×١,٢٠ ١٠^٧×٠,٠٨٧	*
coli-form	١٠^٥×١,٣٥-١٠^٤×٥,١	١٠^٥×٥,٠-١٠^٤×١,٠٣	*
E.coli	١٠^٤×٨,٢	١٠^٤×٧,٥	Non significant
E.coli O157:H7	١٠^٥×٥,٤	١٠^٥×٤,٨	Non significant

-SE = standard error.
*Significant difference (P<0.05

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تلوث ذبائح فروج اللحم المحلي بجرثومة الأيشريكيا القولونية نمط O157:H7 وتأثيرها في الصحة العامة في محافظة ديالى

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الخلاصة

هدفت الدراسة لمعرفة درجة تلوث عينات ذبائح فروج اللحم المحلي بأعداد الأيشريكيا القولونية نمط O157:H7 وتأثيرها الجرثومي في الصحة العامة. جمعت ٦٠ عينة بصورة عشوائية من أسواق خمسة مناطق شعبية لمدينة بعقوبة مركز محافظة ديالى/ العراق، العينات من ذبائح فروج اللحم المحلي المنتج محليا من قبل المربين وبمعدل ٣٠ عينة لكل من الموسم الصيفي من

بداية تموز إلى نهاية آب والموسم الشتوي من بداية كانون الأول إلى نهاية كانون الثاني لدراسة حمولتها الجرثومية من بكتريا القولون وجنس الايشريكيا خصوصا النوع الايشريكيا القولونية نمط O157:H7. وقد تميز العد الجرثومي الكلي بالارتفاع المعنوي ($P<0.05$) في العينات لمجموعة الموسم الصيفي مقارنة بالموسم الشتوي في حين لم يكن هناك فرق معنوي في قيم المعدلات في العد للايشريكيا القولونية وحدة تكوين مستعمرة/غم وجراثيم الايشريكيا القولونية نمط O157:H7 وحدة تكوين مستعمرة/غم في الموسمين. نستنتج من هذه الدراسة أن درجة تلوث ذبائح فروج اللحم المحلي والمحضر محليا في هذه الجراثيم أعلاه تكون عالية خلال موسم الصيف مقارنة بالموسم الشتوي ويعزى السبب إلى ملائمة درجة الحرارة لنمو وتكاثر هذه البكتريا خلا ل موسم الصيف وسوء استعمال طرق التحضير والإنتاج المتبعة وعدم كفاءة المعاملات الحرارية مما يزيد من حمولتها الجرثومية في هذه المنتجات.

الكلمات المفتاحية : دجاج اللحم، الايشريكيا القولونية، أوساط زرعية، إجهاد حراري، مضادات حياتية.