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USES OF INTERNA ORGANS FOR BACTERIAL EVALUATION OF POULTRY CARCASSES

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SUMMARY

Eighteen birds were taken from a flock of line C and A,. They were reared on three types of litters, wood shaving, typha and blady grass until 7 weeks of age. After slaughtering and defeathering the carcasses were kept frozen. samples of breast and thigh muscles ,liver and heart tissues were taken from the carcasses as well as samples of litters which were taken before and after rearing. The results showed that wood shaving contained less bacteria ($P < 0.05$) than the other two , before and after rearing. Litters from pens containing line C had less bacteria counts than that of line A. Samples from carcasses of line C revealed significantly ($P < 0.05$) less bacterial counts than that of line A. Number of bacteria in liver and heart were significantly ($P < 0.05$) higher than those of breast and thigh muscles in both lines. Therefore , it seems to be advantageous to consider the sampling in internal organs (liver or heart) for determination of carcass" bacterial condition.

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Key words: Broilers, Litters, Internal organs, Carcass, Bacterial conditions.

INTRODUCTION

The microbiological condition of poultry carcasses is shown to be influenced by multitude of factors during the rearing period and within the processing plant. These factors includes raw materials used as litter, food, water as well as personal hygiene, the design of plant and building and cleaning efficiency (1) and (2). Several sampling procedures are in use for the enumeration of microorganisms on processed chicken. These includes direct contact plating, swab sampling, rinse sampling, skin tissue removal and using a prescribed weight of excised tissues. Though all these methods have their disadvantages (3). Moreover, microorganisms had been recovered from the neck-skin of carcasses by shaking samples with a set amount of diluent or by maceration (4).

The number of bacteria on poultry carcasses has been shown to vary considerably at different stages on a commercial processing line. The changes include both increases and decreases in the number of microorganisms and also cross-contamination (2)

In the present study, in order to determine the hygienic condition of poultry carcasses, different methods of sampling was tried.

MATERIALS AND METHODS

Eighteen birds were taken randomly from a flock of Fabro breed reared under the same conditions in the same house at Maysan experimental station of the College of Agricultural, University of Basrah. The flock consisted of two lines of birds, namely line "A" provided by IPA Centre for Agricultural Research , Baghdad, Iraq.

Birds of each line were grouped into three replicates according to the types of litter in use, these were woodshaving (WS), typha (T) and blady grass (BG). Three birds were picked from each litter replicates, making a total of nine birds per line. All birds were 7 weeks old.

The 18 birds were slaughtered , defeathered , eviscerated, packed in nylon bags and then deeply frozen at (-20 °C ± 2 °C). Then the frozen carcasses were transferred in an "ice box" to the laboratory where they were stored at (-20 °C ± 2 °C) until being sampled.

For the sampling , 1-2 birds were taken at one time over a period of one month, thawed gradually at room temperature and pieces of breast and thigh muscles, liver tissue and heart (with cloated blood) were excised from each bird aseptically. These pieces were transferred into universal bottles containing 9 ml sterile saline solution and about 0.5 ml layer of washed fine sand. The bottles were weighed before and after introduction of the sample, shaked vigorously for five minutes to ensure the dislogement of bacteria from the tissues. Liver samples were further diluted into normal saline. A volume of 0.2 ml from each bottle were spreaded with sterile "L-shaped" glass-road onto the surface of solid media in a 9 cm diameter petrey dish using three plates of nutrient agar (NA) (Oxide MC3) and six Violet red bile agar (VRBA) (Oxide MC107) for each sample. All (NA) plates and half of the (VRBA) plates were incubated at 37 °C for 18-24 h, while the rest of the (VRBA) plates were incubated at 45 °C in a water bath for the same period to detect fecal coliform bacteria (1), (4) and (5).

In order to determine the effect of litter on the hygienic condition of the poultry carcasses, the three types of litter were sampled before and after the rearing of the birds. Triplicates samples for each type were collected in both cases. One gram from

each sample was mixed well with 100 ml sterile normal saline and was treated as for the tissue samples (1),(2), (3) and (7).

Analysis of variance was obtained to calculate statistical difference among the mean different traits by using factorial experiment (2x3) in block design. The factors were litters (3 levels) and line (2 levels). Different organs were treated as block. Ducan multiple rang test was also used (8).

RESULTS AND DISCUSSION

The average of total viable counts (TVC), total coliforms (TC) and fecal coliform (FC) of different litters before and after rearing are presented in table (1). The table shows that woodshaving (WS) contained less bacteria ($p < 0.05$) than the other two types, both before and after rearing. While, contents of typha (T) and baldy grass (BG) showed no significant differences between them. These findings are different from those of (9) who advised the use of different types of materials as poultry litters. It is apparent that the reduced bacterial contents of (WS) prior to rearing had contributed towards the reduced counts post the rearing period. The bacterial counts of all litters samples from rearing pens containing the light broiler line (C) were less than those of heavy line (A) but the differences were not significant. This could be explained in the light of the fact that heavy lines excrete more than light lines.

The average of bacterial counts from the different organs of both lines of birds are presented in table 2. The results showed that the number of bacteria in liver and heart samples were significantly ($p < 0.01$) higher than those of breast and thigh muscles. While, no significant differences were shown between liver and heart samples on one hand and breast and thigh muscles on the other in both lines. These results corresponds closely to those of (9) who stated that the microbiological condition of poultry carcasses is shown to be influenced by the general hygiene

of birds. Study of the microbiological condition of poultry carcasses is a common practise and the results depends on the method in use. Therefore the present results differed from those of (10) who stated that the thigh muscles had significantly greater count than the breast muscles, and also differed with those of (3) who reported that skin tissue method showed more accuracy and precision in sampling.

Estimation of correlation coefficient between numbers of bacteria in liver or heart and those of breast or thigh muscles revealed the figures; 0.62,0.74,0.62 and 0.60 respectively and they were significant ($p < 0.01$).

It is possible to predict the numbers of bacteria in 1 gram of muscles through estimation of regression coefficient from the numbers of bacteria in one gram of liver or heart tissues and as follows:

No. of bacteria in 1 g breast muscles = 32.80 + 0.05 (No, in 1 g liver tissues)

No. of bacteria in 1 g breast muscles = 30.98 + 0.05 (No, in 1 g heart tissues)

No. of bacteria in 1 g thigh muscles = 42.35 + 0.10 (No, in 1 g liver tissues)

No. of bacteria in 1 g thigh muscles = 87.90 + 0.14 (No, in 1 g heart tissues)

Moreover, it has been pointed out that tissues are often not as sterile as is commonly assumed, and organisms, for which the conditions for growth are not favourable, may be present (11). Therefore, it could be advantageous to consider the sampling of internal organs (liver , heart) for determination of carcass bacterial contents instead of muscles which will not render the rest of the carcass unmarketable.

Table 1: The bacterial counts of litters and lines before and after rearing

Traits	TVC		TC		FC	
	before	after	before	after	before	after
Wood shaving	1.1E5^{a*}	4.2E8^{a}	5.1E4^{a}	2.8E8^{a}	2.1E4^{a}	1.0E4^{a}
Typha	1.8E5^{b}	5.9E^{b}	8.5E4^{b}	4.0E8^{b}	3.1E4^{b}	1.9E8^{b}
Baldy grass	1.9E5^{b}	5.7E8^{b}	8.5E4^{b}	3.7E8^{b}	4.0E4^{b}	1.5E8^{b}
Line A	-	5.4E8	-	3.9E8	-	1.6E8
Line C	-	5.1E8	-	3.1E8	-	1.4E8

TVC= Total viable counts; TC= Total coliforms ; FC= Fecal coliforms.

* Figures at the same column within each trait with different subscripts are significantly different at 5%.

Table 2: Bacterial counts of carcass samples ,litters and lines

Traits		TVC	TC	FC
Litter	Wood shaving	512.87^{a*}	576.50^{a}	163.20^{A}
	Typha	4282.12^{b}	9028.5^{b}	1290.3^{B}
	Blady grass	5327.50^{b}	5538.0^{b}	1439.5^{B}
Line	C	2445.40^{a*}	3140.3	711.83^{a*}
	A	2620.10^{b}	2992.6	1781.0^{b}
Organ	Liver	5983.20^{B**}	3414.67^{B**}	838.67^{B**}
	Heart	6274.00^{B}	3177.67^{B}	1356.0^{B}
	Breast muscles	422.0^{A}	120.5^{A}	67.67^{A}
	Thigh muscles	818.8^{A}	180.0^{A}	150.83^{B}

TVC= Total viable counts; TC= Total coliforms FC= Fecal coliforms.

* Figures at the same column within each trait with different subscripts are significantly different at 5%.

** Level of significancy is 1 %

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استخدام الاعضاء الداخلية لذبائح الدجاج لتقييم الحالة الجرثومية لهذه الذبائح

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الخلاصة

استخدم في هذه الدراسة ثمانية عشرطيرا بعمر سبعة اسابيع من الخطين (A) بعد ان تم اخذها بصورة عشوائية من القطيع الذي تمت تربيته على ثلاث انواع من الفرش وهي نشارة الخشب والبردي والحلفة .

حفظت الذبائح بالتجميد بعد الذبح ونزع الريش. اخذت عينات من عضلات الصدر والفخذ والكبد والقلب وكذلك عينات من الفرشة قبل وبعد التربية.

اظهرت النتائج ان فرش الطيور من الخط (C) احتوت على اعداد من البكتريا اقل من فرشات طيور الخط (A) وهذه النتيجة انعكست على ذبائح الخط (C) حيث احتوت اقل بكتريا أ (0.05) من ذبائح الخط (A) . واظهرت اعداد البكتريا في الكبد والقلب فروقا معنوية أ (0.05) اعلى من تلك الموجودة في عضلات الصدر والفخذ . ومن خلال معامل الانحدار العالي المعنوية للاعضاء الداخلية (القلب والكبد) وعضلات الفخذ والصدر يمكن استخدام الاعضاء الداخلية (القلب والكبد) لتقييم الحالة الميكروبية لذبائح الدجاج.