Controlling the Bacteriological Quality of Expensive Chicken Meat

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Abstract

The objective of this study is to assess the bacteriological quality of broiler meat from the Skikda wilaya slaughterhouse in order to estimate the dangers it may have on public health. To be done, twelve (12) broiler meat samples were randomly collected at a rate of 3 samples per month. The desired germs are described in the Official Journal of the Algerian Republic number 35 (1998) mesophilic aerobic germs, fecal coliforms, *Staphylococcus aureus*, *Clostridium* sulfito-reducors and *Salmonella* sp. Comparison of the 4-month contamination averages conducted by the One Way ANOVA test with a Greenhouse Geisser Correction - 0.01 reveals a non-significant difference between the months of the samples (p - 0.021) with an increase in February to May when they reach their peak.

Keywords: Bacteriological Quality; Broiler Meat

Introduction

Chicken meat is considered a food of choice because of its nutritional value. Its richness in water and protein of high biological value (20 to 23 g/100g), low lipid intake and no carbohydrate intake [1] makes it an indispensable food for a balanced diet. However, these same reasons make it a breeding ground for most microbial contaminations, from multiple breeding sources and the various stages of slaughter, including evisceration and scalding, which have a multitude of opportunities to transfer germs to carcasses. Nevertheless, the factors that contaminate chicken meat with pathogenic germs and saprophyte bacteria are mainly poor staff hygiene and manipulation, as well as cross-contamination [2] that can affect the quality of chicken meat and therefore cause risks to consumers. These risks can be quite serious including food poisoning often caused by *Salmonella* sp., *Staphylococcus aureus*, *Clostridium* sp and *Escherichia coli*. In addition, the World Health Organization reports that hundreds of millions of people worldwide suffer from food-borne diseases and that animal products top the list of causes [3]. For this to happen, the hygienic quality of chicken meats must be taken into account to ensure their safety, which has become a major issue for governments, consumers and professionals of products for consumption. appropriate controls to ensure that food produced is properly handled, packaged, transported, served and sold in accordance with national legal and regulatory requirements.

Materials and Methods

Twelve (12) samples of broiler meat were randomly collected from the Skikda willaya slaughterhouse to track microbiological contamination. The samples were packaged in sterile bags and transported to the laboratory under cold cover (cooler) and stored between 0 and 4°C for analysis within 24 hours of receiving them.

Bacteriological analysis of chicken meat:

Preparation of mother suspension and decimal dilutions:

- The search technique was carried out according to the official Algerian newspaper 1998 (standardNF V 08- 010).
- Test take: After preparing the workstation, in a sterile bag tarred 25g of the chicken meat are weighed aseptically.
- Counting the FAMT at 30°C;

- Research and counting of thermotolerant coliforms and *Escherichia coli:*
- Search for *Staphylococcus aureus;*
- Search and count sulfito-reducing anaerobics at 46°C;
- Search for *Salmonella*:

Interpretation method

The results of bacteriological analyses are interpreted from the microbiological criteria set by Algerian standards. These criteria for assessment are defined by the ministerial decree of 27 May 1998 published in the Official Journal of the Democratic and People's Republic of Algeria No. 35. They are recorded in the table below.

Germs Research	n	m
Aerobic germs a 30°C	5	5.10^5
Califormes fecaux	5	10^3
Staphylococcus aureus	5	5.10^2
Clostridium sulfito-reducteurs a 46°C	5	30
Salmonella	5	Absence

Table 1: *Microbiological criteria for raw boneless poultry.*

n: Number of units in the sample.

m: The limit for starting samples in two groups: acceptable and unacceptable.

The interpretation of the results is based on the two-class plan (Figure 1): The results of the examinations interpreted on this basis allow to determine two classes contamination. This type of plan does not accept any tolerance-"Absence in": the result is considered satisfactory; "Presence in": the result is considered unsatisfactory; in this case, the product is declared unfit for consumption.
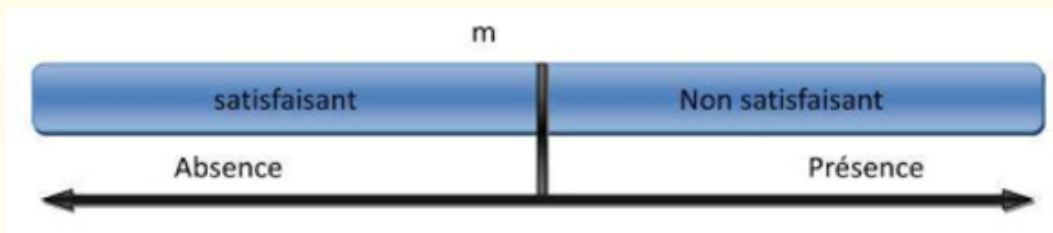

Figure 1 : *Plan a Deux Classes.*

Statistical analysis

Determining average rates of contamination of broiler meat: Averages of contamination rates per month are calculated by the following formula:

Y'x/n

x: The number of germs sought (UFC/g Log)

n: the number of samples each month.

The results are presented by Log UFC/g.

Le test ANOVA One Way (p < 0,01):

We used the One Way ANOVA test with Greenhouse Geisser Correction at p-lt;01 to do statistical analysis. The data was processed by IBM SPPS software.

Results and Discussion
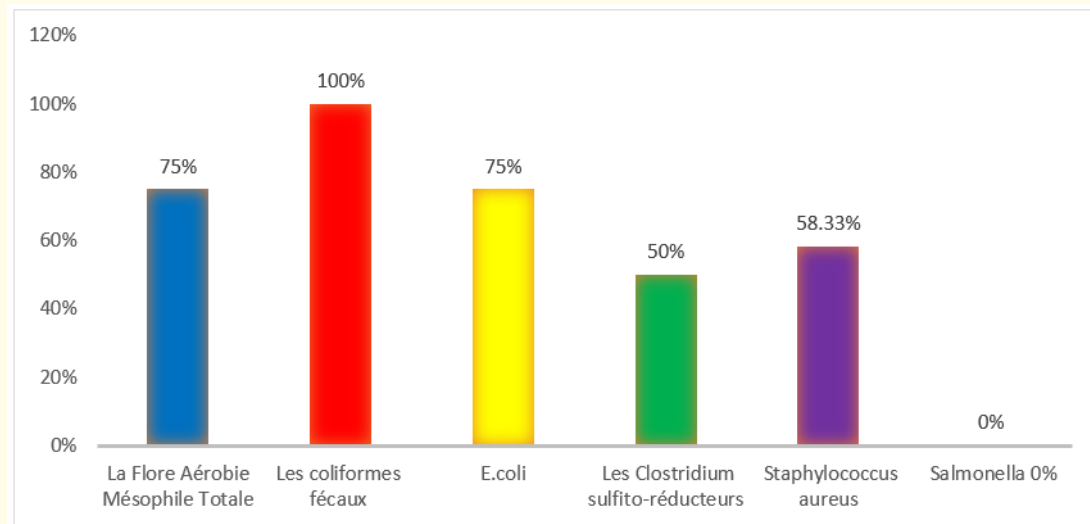
Bacteriological analysis

Figure 2: *Bacteriological analysis of 4-month contamination rates.*

Total mesophilic aerobic flora (FAMT) at 30ºC

The FAMT colonies obtained on PCA agar are of various shapes and sizes and, creamy whitish in colour, this flora is a fairly tangible reflection of general hygiene conditions. It informs us about the cleanliness of the handlings, the efficiency of the preparation processes and the conditions of preservation and the freshness of the products [4]. The results shown in table show that 75% of the samples analysed have values of a FAMT that are higher than the bacteriological criteria determined standards set out by the J.O.R.A (1998) (5.105 UFC/g) indicating that 75% of samples are considered unsatisfactory in relation to this parameter High FMAT loads may be explained by the presence of a failure of the cleaning-disinfection of slaughterhouse equipment and the fact that in the case of wet treatment, scalding water and washing water are often unrenewed constituting a significant source of carcass contamination [5].

Fecal coliforms at 44oC

The colonies of fecal coliforms obtained on VRBL agar are round, red in colour and of size equal to or greater than 0.5 mm.

Fecal coliforms results are present in all samples analyzed (100%) and have rates higher than the bacteriological criteria accepted by the J.O.R.A (1998) (UFC/g) indicating a high possibility of contamination with pathogenic bacteria [6]. All samples are therefore unsatisfactory compared to fecal coliforms, despite the application of the system in the slaughterhouse. This can be explained by poor hygiene conditions particularly due to fecal contamination and therefore defects that occur during evisceration, this stage of slaughter is considered to be the most important source of contamination of carcasses [7] orunhygienic behaviours of manipulators, since coliforms are saprophyte bacteria in the digestive tract of humans and animals [8]. Bleeding is done with rarely cleaned or disinfected knives, which can lead to the introduction of thermotolerant coliforms into the system. circulatory and muscle. According to the [9]. The contamination of knives confirms fecal contamination due tonon-compliance with hygiene rules.

Escherichia coli

After the addition of a few drops of the Kovacs reagent in the Urée-Indole environment: the formation of red ring (Indole) and the non-change of the initial color of the medium (Urea-) confirm the presence *of E. coli*. We noticed the presence *of E. coli* in 58.33% of the samples. *E. coli* is an indicator of recent fecal contamination. It is found in the digestive system of humans and warm-blooded animals. This bacterium can contaminate the meat durings laughter**.** According to the [11], the main source of Contamination of Chicken Meat with *E. coli* is the intestinal tract. Their presence corresponds to a defect of the slaughter technique, or cross-contamination, but may also be due to contamination by people during handling. *E. coli* raises fears of other more dangerous germs such as *Salmonella* [12].

Clostridium sulfito-reducors

After growing on the VF medium with iron alun and sodium sulphite we noticed the presence of black colonies growing deep Microscopic observation after Gram coloring showed Gram bacilli, isolated or chain Based on the results obtained *Clostridium* sulfito-reducing are present in 50% of the samples and which are characterized by values above the bacteriological standards (30 UFC/g) allowed by Algerian regulations (J.O.R.A 1998) *Clostridium* sulfito-reducing are considered to be control germs of hygienic quality of animal products. They are hosts of the digestive tract of animals and humans. Their presence in meats reflects a migration of these germs from the intestinal tract to the animal's tissues. Meat can also be contaminated with this germ at the time of evisceration if the contents of the intestine come into contact with the carcass [13,14]. Their presence may therefore also be a sign of mishandling of broiler meat.

Staphylococcus aureus

Staphylococcus aureus form creamy pigmented (typically yellow) and opaque colonies on Chapman's environment. Are characterized by the color shift of the Chapman medium from red to yellow which results in the fermentation of mannitol with release of acidic products [15]. The bacterium is therefore mannitol, catalase and coagulase - Microscopic observation after Gram coloring showed Cocci Gram, in the form of a bunch of grapes The results indicated show that 58.33% of the samples analysed did not meet the standards (5.102 UFC/ml) accepted by Algerian regulations (J.O.R.A, 1998). These samples are therefore considered unsatisfactory.

According to [16], *Staphylococcus aureus* is a germ of human-caused contamination due to poor hygiene. The skin remains more contaminated than the muscle due to the presence of *Staphylococcus* in the hair follicles. This bacterium can be easily dispersed in the environment and can thus contaminate food [17]. Risk factors that affect the number of S. aureus present at the sample level studied, the cleanliness of the fingers of the featherers and the water used during scalding and the precautions taken by staff at the time of evisceration. Indeed, during slaughter operations, inter-contamination phenomena occur, which leads to a proliferation of pathogens on initially healthy carcasses [18].

Salmonella sp.

In our work, isolation on Hektoen gave rise to two cases: 7. The formation of colonies from yellow to yellow-salmon. The latter is due to the fermentation of at least one of the three sugars: lactose, sucrose and salicin. These colonies are characteristic of coliforms The formation of blue-green colonies with a black centre: suspicion of *Salmonella*, Differentiating from *Proteus.* The presence or not of *Salmonella* has not been confirmed, we have had colonies that have characteristics similar to those of *Proteus*. Biochemical identification by gallery API 20E, medium TSI and medium mannitol mobility as well as the use of identification software (API software) allowed us to confirm that the suspect bacterium is Proteus vulgaris. Proteus are part of the normal intestinal flora of humans and are also ubiquitous in the environment [19-22] and found in animals, soil and polluted water, among others.

These results indicate a total absence of *Salmonella* in all broiler meat samples analyzed. They therefore comply with the standards accepted by Algerian regulations (J.O.R.A, 1998) (m-0) and of satisfactory quality compared to *Salmonella*. This can be explained by the good breeding conditions in the broiler unit including the application of a sanitary vacuum every end of delivery and the use of broad-spectrum disinfectants to disinfect the premises. According to [23,24], poultry contaminated during livestock is a very important source of *Salmonella* spread. Good hygiene can solve the majority of problems in livestock. "Breeding is nothing but hygiene in action".

Average Assessment (UFC/G Log) of 4-month contamination rates: Comparison of 4-month infection averages was conducted by the One Way ANOVA test with a Greenhouse Geisser correction at p - 0.01). We noticed a non-significant difference between the months of the samples (p - 0.021) figure 3, on the other hand the averages shown in figure 3 reveal an increase in contamination rates from February to May where they reach their maximum. This is probably due to the increase in temperature.

Germs multiply all the more slowly as the temperature is low [25]. Lack of hygiene is favoured by the temperature and humidity conditions of the local climate [26].
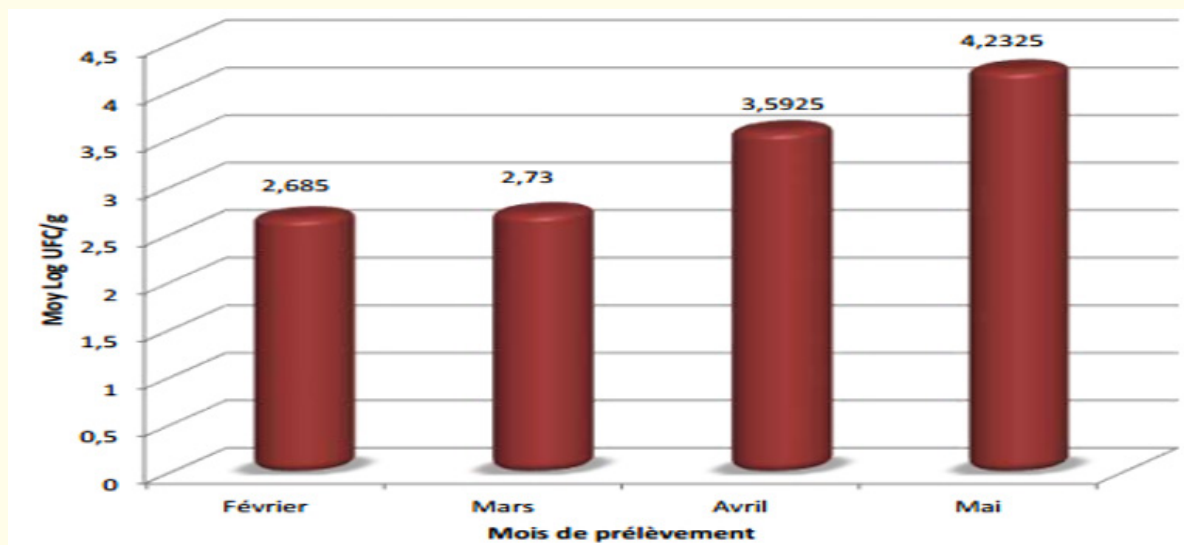

Figure 3: *Average 4-monthinfection rates.*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Greenhouse-Geisser	6,631	1,404	4,722	11,825	,021	,798

Table 2: *Comparison of 4-month ANOVA One Way test averages with Greenhouse Geisser Correction - 0.01.*

df: degree of freedom.

F: Fisher.

Gis. In: Meaning.

Conclusion

Finally, the message that could emerge would be that broiler meat can be a hazard from multiple sources, so consumers in these conditions should have in their minds that the food they eat can be contaminated. In addition, agri-food companies must be required to carry out self-controls and these are supplemented by formal and mandatory controls and slaughterhouses are now required to put in place based on the use of the HACCP method.

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