

# Consumption of Industrially-Produced Chickens in Senegal and Risks to Public Health

E. CARDINALE,<sup>1</sup> F. TALL,<sup>2</sup> P. KANE,<sup>2</sup> M. KONTE<sup>2</sup>

<sup>1</sup> Dept. of Animal Production and Veterinary Medicine, Center for International Cooperation in Agricultural Research for Development (CIRAD-EMVT) and Senegalese Institute for Agricultural Research (ISRA), ISRA-LNERV, BP 2057, Dakar-Hann, Senegal. Email : [eric.cardinale@cirad.fr](mailto:eric.cardinale@cirad.fr)

<sup>2</sup> Senegalese Institute for Agricultural Research, ISRA-LNERV, BP 2057, Dakar-Hann, Senegal.

## Abstract

Senegal has been taking part in the worldwide industrial poultry boom, in response to growing demand for animal protein by the urban population in and around the capital city, Dakar. A rise in productivity over the past decade has made this chicken the cheapest meat available. However, the expansion has occurred without any systematic control of hygienic practices along the supply chain, and research by the authors shows that up to 9 % of the chickens sold have unacceptably high levels of contaminants, particularly Salmonella. The health risks to consumers are compounded by preparation methods in the expanding restaurant and fast-food sector, where hygiene practices are wanting and where the cooking temperatures are too low to kill the harmful germs. Resolving these health problems is an important issue for public health in Senegal. It is also a challenge that the industry must meet in order to remain competitive in the context of the new free trade area being established in West Africa. For this, health authorities need to focus not only on improving controls, but also on education and outreach programs for the professionals in the chain, to encourage adoption of improved practices. There is also a role for educating consumers on safe cooking and hygiene practices in the urban environment.

## Introduction

Industrial poultry farming is currently booming worldwide. In 1997, poultry production reached a global total of 51 million t. In 5 years (from 1992 to 1997), this production increased by 40 percent, while beef and mutton output diminished by 5 and 8 percent respectively over the same period.

In Senegal, to meet the needs of an ever-growing urban population and a constantly increasing demand for animal protein, nearby semi-industrial poultry production has developed in the urban and peri-urban area. Most of this activity takes place within a radius of 100 km around the capital city, Dakar, and produces 6 million meat-producing chickens per year. From 1992 to 1998, output expanded by 20 percent, increasing from 6 000 to over 7 000 t per year. Improved productivity allowed a reduction in the costs of production, and today, the chickens produced by these modern farms provides the cheapest meat available to Senegalese consumers (1,350 F CFA per kg).

However, there is a downside to this glowing report. Production does not occur within the framework of a well developed poultry supply chain. Notably, there is a lack of chicken slaughterhouses and the products sold (whole chickens, occasionally chicken parts) are often of dubious quality. Furthermore, in Senegal, quality control of meat-based foodstuffs is still quite underdeveloped, with the exception of the fishing industry, where international trade imposes draconian conditions. Quality can be summed up by the product conditions that are established between the customer and the supplier, but these never address the problem of microbiological contamination. It is high time that this problem be addressed. Since the successive crises of mad cow disease and dioxin poisoning, the Senegalese consumers' trust has been seriously shaken, and it must be restored if the poultry industry is to prosper. In addition to this, the new UEMOA (Economic and Monetary Union of West Africa) customs tariffs will allow quality-controlled poultry products to enter the country. To be competitive, Senegalese products will have to offer at least the same health guarantees. Finally, the poultry production industry is becoming the leading animal industry in terms of turnover and could move into exports, in particular to countries of the region.

## **The Research Problem**

To be appropriate for consumption, in addition to its nutritional and organoleptic qualities, chicken meat must above all be a healthy product; that is, free of disease-causing germs that present a risk to human health. Today, its low price makes it an attractive product for the Senegalese homemaker, but the microbiological controls of the product for sale are too rare, and it is thus important to check the hygienic quality to avoid all risks to human health.

Research was undertaken with three objectives:

- To determine the microbiological quality of industrially-produced chickens to assess the potential risk to public health;
- To identify the risk points throughout the entire process that could introduce a microbiological hazard or facilitate its multiplication;
- To inform the various public health players in order to formulate a quality policy in the poultry farming industry, and to train the breeders, meat packers and sellers in the basic rules of hygiene.

## **Methodology**

The research consisted of a set of surveys, sampling and laboratory testing.

The first survey focused on the various uses of industrially-produced chickens, and was addressed to homemakers, restaurants, supermarkets and shops. This permitted determination of the main chicken-based dishes, including evaluation of cooking methods.

A second survey was carried out at the level of chicken farmers, and focused on selling methods used for the chickens. Some poultry farms carry out the slaughtering, others leave this to the resellers, who slaughter the chickens and then sell them, some resellers sell but do not slaughter, etc.

Sampling of meat-producing chicken carcasses was done on poultry farms<sup>1</sup> (on farms where chickens are slaughtered on-site), at the various points of sale, and directly in restaurants

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<sup>1</sup> The farms, points of sale and restaurants were randomly chosen. Two types of farms are represented: farms where the slaughtering operations are carried out, and farms where live chickens are produced to be slaughtered elsewhere.

(the Tangana neighborhood in particular). Microbiological analysis was carried out on the meat and skin (detection of total aerobic mesophile microbial flora (TAMF), heat-resistant coliform bacteria, *staphylococcus aureus*, *salmonella spp* and *campylobacter*). Particular attention was paid to the risk of salmonella, as the meat of industrially-produced chickens is that in which this germ is most commonly isolated.

Finally, the team conducted a systematic identification of risk points along the entire industrially-produced chicken supply chain, using an HACCP approach (hazard analysis and critical control points):

- Monitoring of groups of day-old chicks on the farms to highlight the risk of salmonella and other diseases;
- Evaluation of the cases of clinical salmonellosis on farms through the intermediary of the RESESAV (Senegalese Network for the Epidemiological Surveillance of Poultry);
- Evaluation of the health measures implemented on the farms (feed used, water used, presence of vectors, cleanliness of staff);
- Evaluation of the risk of contamination during transportation: means of transportation used, cleanliness and maintenance of the means of transportation (when animals are transported alive);
- Evaluation of risks during the various slaughtering operations (bleeding, scalding, plucking, evisceration): equipment used and cleanliness; work methods (temperature, time, etc.); workforce employed; site on which the operations are carried out;
- Evaluation of risks during the conservation of carcasses and their transportation to the point of sale (means of transport used, maintenance, temperature, time, etc.);
- Evaluation of risks at the points of sale: conservation temperature, time, storage equipment used, maintenance, sales staff, etc.

## Results

### Microbiological Monitoring of the Chicken Meat

The criteria used in food hygiene laboratories and chosen as references for satisfaction are listed in Table I.

Overall, 350 chickens were analyzed and proved to be satisfactory in 75% of the cases, acceptable in 16 % of the cases, and unsatisfactory in 9 % of the cases. *Salmonella* germs were isolated in 10% of the skin samples and 7% of the muscle samples. 15 different serotypes were identified, including one new OMC-type serotype that demonstrated multiple antibiotic resistance. *Campylobacter* (mainly *C. jejuni* and *coli*) were isolated in 30% of the carcasses.

### Survey Results

#### Hatcheries and Farms

Most of the analyses based on the sanitary inspection of day-old chicks were satisfactory with the exception of two batches, in which *Salmonella pullorum gallinarum* was found. Samples of droppings from the farms showed the presence of Salmonella (15%) and *Campylobacter* (30%). These results confirm the potential role of the farm in the contamination of the chickens.

The presence of these disease-causing germs can be explained by a deficiency in the hygienic measures applied, notably in the unscrupulously carried out decontamination

operations (resident Salmonella), insufficient control of inputs (feed, water), and the absence of measures taken against rodents, insects and vectors in general.

### **Slaughtering Sites**

The analyses of slaughtering practices show three broad types of slaughtering: slaughterhouses that observe good hygienic practices and slaughterhouses that practice dry slaughtering or wet slaughtering in very precarious hygiene conditions. Slaughtering procedures have repercussions on the contamination of the carcass, the highest rates of contamination being observed in the carcasses that have been wet-slaughtered in unhygienic conditions.

### **Points of Sale**

Three types of sales practices were also outlined, differing from each other in the refrigeration system to which the carcasses are subjected (room temperature, refrigeration, freezing) and by the presentation of the carcass (total, partial or no evisceration). The sales practices mainly served to amplify the bacterial contamination of the chicken carcass that had occurred during a previous stage.

### **Risk for the Senegalese Consumer**

Chicken-based dishes such as “chicken yassa”, chicken with rice and “chicken shawarma” are deeply rooted in Senegalese traditions. These dishes can present risks for the consumer: the internal temperature of the meat never exceeds 55°C, a temperature that is too low to ensure the destruction of disease-causing bacteria. The risk is aggravated by the fact that these dishes are often eaten with a sauce that can recontaminate the meat. Shawarma presents a particular danger because it is reconstituted and because of the large amount of human handling required to prepare it.

### **Conclusion**

It appears that there is a real danger in the consumption of industrially-produced chicken meat, particularly when the dishes traditionally eaten by the Senegalese are taken into account. The improvement of hygienic quality requires the education of the various players involved in the industry, namely, the breeders, resellers, slaughtering teams and sellers. In addition, the homemaker must follow some basic rules of hygiene that will prevent her from taking unacceptably high risks.

The interventions of agricultural service teams must also take this direction, with more controls in the industry and on the end-products. However, these interventions should not be made in a repressive way, rather, the professional should be made accountable for these major quality risks. It is only by observing this policy in practice that Senegalese poultry farming, and notably the growing modern sector, can resist against imported chicken parts that will invade the market once the customs barriers are lifted. It is also the only way that these operators may be able to envisage exports.

### **References**

JOUVE, J.L., 1996. La qualité microbiologique des aliments: Maîtrise et critères. 2<sup>nd</sup> edition, CNERNA-CNRS, Ed. Polytechnica, Paris.

**Table I. Reference standards**

<i>Germ</i>	Satisfactory	Acceptable	Unacceptable
TAMF	$<5.10^5$	$>5.10^5$ and $< 5.10^6$	$> 5.10^6$
Heat-resistant coliform bacteria	$<10^4$	$>10^4$ and $< 10^5$	$> 10^5$
<i>Staph. aureus</i>	$< 10^3$	$>10^3$ and $<10^4$	$> 10^4$
Salmonella	Absence in 25 g of muscle		Presence
Campylobacter		No standard	

Source: JOUVE, 1996