Poultry products: the challenge of food safety

Poultry products are a very healthy and very sustainable source of food for the growing world population.

However, food safety is one of the major challenges in the poultry processing industry. Everybody remembers the big headlines in the newspapers about salmonella and campylobacter bacteria on chickens.

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Biological contamination

Bacteria are small organisms of 1 to 4 micron large, able to multiply themselves by splitting.

The multiplication time depends on the circumstances (temperature, oxygen, water, acidity, nutrients). Circumstances may be perfect for one type but deadly for another. Under ideal circumstances it takes only 20 minutes to split into 2 cells.

So, the bacterial count can increase from 1 to 2 after 20 minutes, to 4 after 40 minutes and to 8 after 60 minutes. If the count doubles every 20 minutes, the count will reach 68,000,000,000 within 12 hours.

The Encyclopedia of Food Safety provides several definitions:

Food safety is defined as:
"The assurance that a food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use."

A food may harm the consumer if it contains any sort of contaminant.

Contaminants are defined as:
"Any biological, chemical or physical agent not intentionally added to food, which is present in food as a result of production, manufacture, processing, preparation, transport or holding of such food."

Luckily, the growth of bacteria is reduced and stopped by a lack of food, and a surplus of waste.

Thousands of different bacterial types exist, all with their own characteristics, requirements and vulnerabilities. Salmonella bacteria and campylobacter bacteria are the most dangerous bacteria for the poultry industry.

- **On the farm**

Day-old chicks are generally salmonella and campylobacter-negative. A flock can be infected by a mouse (or even just a fly) entering the house. Both pathogens easily grow in the intestines of chickens, but do not make the birds ill. The pathogens multiplied in the intestines are excreted and subsequently contaminate other birds. In the case of campylobacter, the percentage of infected birds may stay at 0% for four weeks, and then suddenly rise to 100% within a week.

At the day of slaughter, feed must be withdrawn at the correct time: if the feed withdrawal time is too short (less than eight hours) the intestines may still be full at slaughter, increasing the risk of biological contamination. If the time is more than 12 hours, their intestines become weaker, also increasing the risk of biological contamination.

A too long feed withdrawal time also reduces animal welfare and yield.

- **In the processing plant**

The bacterial counts show a 90% to 99% decrease during immersion scalding, but a significant increase during plucking. In the other stages of processing no increase takes place and there is often a decrease, for example during chilling. Obviously faecal contamination and cross contamination must be avoided.

- **Transport and storage**

At refrigeration temperatures (<3°) salmonella and campylobacter do not grow, so numbers remain stable or decrease.

- **The consumer**

Pathogenic bacteria which survived processing, transport and storage, will die during proper cooking. In case of poor cooking or poor kitchen hygiene, some bacteria will still be present at the moment of consumption.

Most of them will be killed in the acidic human stomach. However, if many bacteria are ingested, some may survive the stomach, reach the human intestine and start multiplying in the human intestine.

After 6-48 hours (the incubation time for salmonella) the consumer may suffer from salmonellosis (abdominal cramps, diarrhoea and vomiting) for several days. The incubation time for campylobacter is generally about 72 hours; the symptoms of campylobacteriosis are even worse than the symptoms of salmonellosis.

Outbreaks of salmonellosis and campylobacteriosis can lead to juicy headlines in newspapers, affecting the image of poultry processing.

So, stakeholders in the poultry processing business (like Meyn) have good ethic and economic reasons to improve poultry-related food safety.

Chemical contamination

Chemicals like dioxin, and fipronil are examples of chemical contamination.

Physical contamination

Physical contamination is the presence of, for example, bone particles in fillets. The wishbone in the breast fillet is especially dangerous because it can get stuck in the throat. Therefore, stakeholders in our business feel a shared responsibility to improve food safety

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to protect consumer health and to protect the business. Several measures can be taken to reduce the risk of a food hazard.

● **On the farm**
Biosecurity is the definition for the group of preventive measures taken to lower or eliminate the risk on the import of animal diseases within a company and the spread of those diseases to other enterprises.

Typical measures include the ban on transport of poultry, in case of avian influenza, placing footbaths at the entrance of a poultry house, and the requirement to wash hands and to wear clean clothes and boots on the farm.

● **In the processing plant**
Hygienic processing is secured by a Hazard Analysis and Critical Control Point (HACCP) system.

This is a preventive system which identifies, evaluates and controls hazards which are significant for food safety. The system is partly tailor-made and should focus on all relevant biological, chemical or physical hazards. For example the hazard of a wishbone in a fillet is reduced in two steps:
– Minimise the chance that wishbones end up in a fillet during deboning.

– Maximise the chance that a remaining wishbone is detected by x-ray, and is subsequently removed.

This is where Meyn comes in, reducing biological and physical risks.

Reducing biological contamination

Years ago, Meyn introduced the successor of the Jacuzzi scalder, the jet stream scalder, which has the following benefits:
● **Washing effect.**
With immersion scalding the massive rinsing leads to a 90-99% reduction in enterobacteriaceae and campylobacter on the carcases.
● **Pasteurisation.**
A benefit of jet stream scalding, compared to Jacuzzi, is the fact that the scalder can pasteurise itself, simply by increasing the temperature to pasteurisation levels.

The fact that the jet stream scalder does not inject air leads to two hygienic benefits:
● **No foam.**
In a Jacuzzi scalder, the injection of air into scald water containing some blood, leads to the formation of foam, which is a perfect environment for bacterial growth.
● **No air duct system.**
This part of the Jacuzzi scalder was the hardest part to clean; the jet stream system does not require an air duct system, making cleaning much easier.

Benefits of the jet stream scalder also include saving of water and energy, but these advantages are not related to food safety.

By the end of this year, Meyn plans to launch a system to pasteurise live bird containers by dipping them in hot water, thereby reaching all surfaces of the container without the use of any chemicals.

After the slaughter department the bacteria are still loosely attached to the skin, so their count can be reduced by rinsing. Meyn has optimised existing rinsing stages with their Maestro eviscerator rinsing cabinet by using Undine technology, greatly improving the efficiency of rinsing.

Meyn has also developed additional washing stations to rinse the chickens in the slaughter- and evisceration department to further reduce bacterial counts.

Reducing physical contamination

● Lower bone content after deboning. Extensive R&D has resulted in a lower chance of remaining bone particles in breast meat and leg meat after deboning.
● Improved x-ray. As a finishing touch, Meyn has enabled the poultry business to enter a new era of bone detection by releasing a new state-of-the-art x-ray bone detection system.

Clearly Meyn has made significant steps to improve food safety and the company is also aware that further steps need to be taken. Several ideas and projects to further improve food safety are in the R&D pipeline and are expected to be released in the short- and medium term. ■