

Focusing on Salmonella

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The processing plant

In considering salmonella and its dynamics in processing we will take poultry as an example. This is because we have a good working knowledge of salmonella in a poultry context, the equipment is more developed and the numbers involved bring a whole new dimension to the subject.

Let us start by considering the basics. First, if no salmonella come into the processing plant there will be none to go out on the product. However, salmonella does occur on poultry farms and from time to time it will come into our plant.

Second, when it does come we want to minimise the multiplier effect of processing under which <1% of birds coming into the plant are carrying salmonella, but well over 75% of carcasses leaving the plant are contaminated with salmonella.

Effective control points

The only effective Critical Control Point (CCP) is cooking, providing we can prevent post intervention (cooking) recontamination with salmonella. Other CCPs of a chemical nature have recently come on to the scene and are being developed. Results look promising but this will not be covered here. Other CPs exist such as rinsing and temperature and these will be addressed.

When considering salmonella and the incoming birds, it can only be in three places – on the feathers, in the digestive tract or, in the case of invasive strains such as Salmonella enteritidis, in the internal organs.

The key management aspect in relation to the first two of these is to separate the feathers and digestive tracts from the birds as quickly and efficiently as possible and to remove them from the processing area. If we have a poor standard of defeathering or if digestive tracts are ruptured and have their contents spilt out over the carcass during the evisceration process, the level of salmonella contamination will be increased.

In both these scenarios the issue of line speed plays a role as the slower the line speed the better these tasks are executed and hence less contamination.

However, slowing down line



Spraying at evisceration, as well as immediately after, is good practice.

speeds significantly impacts hourly output.

Let us follow the birds through processing and consider management factors relevant to salmonella control. If the lorry and crates bringing the birds to the plant have not been thoroughly cleaned and sanitised, they could be contaminated with salmonella from a previous load and this could contaminate the current load of birds.

The early processes include killing, scalding and defeathering. The last two of these present ideal opportunities for cross contamination to occur.

During scalding if the temperature of the water is too high the carcasses/skin can be damaged or discoloured, so there can be a tendency to err on the side of caution which favours salmonella survival and multiplication.

The scald tank is not designed for salmonella control and often the carcasses are passing through a 'bacterial soup' which favours bacterial cross contamination.

New technologies like the AeroScalder should improve the situation as this system uses hot moisturised air for scalding rather than immersing carcasses in water, thereby removing a key cross contamination opportunity.

Immediately after scalding the birds pass into the defeathering machines with the rapidly revolving fingers. However, the flying feather debris and water spray also favour bacterial cross contamination.

From this stage onwards, it should be remembered that the longer organic debris (blood, bile,

feathers and/or faecal material) stays on the carcass the more it adheres, and the harder it is to rinse off, so the sooner the carcass is rinsed the better it will be cleaned.

From the point of view of salmonella control the strategic placing of sprays to regularly rinse carcasses is important but these must be targeted onto the carcasses (often they are not).

Ideally, sprays should be placed immediately after a process that contaminates carcasses, for example, defeathering, evisceration, etc. In some plants, this can present a dilemma because of the cost of water or shortage of supply.

Minimise carcass handling

Integral to minimising carcass contamination with salmonella is minimising carcass handling and the avoidance of cross contamination points. A cross contamination point is a point that each and every carcass has contact with.

It has been shown with marker organisms that if a contaminated carcass contaminates such a point, that organism can be detected on the next 100-200 carcasses.

As has already been mentioned, evisceration is a key process and if not done to the highest standards can result in the contamination of carcasses with intestinal contents.

A key aspect of line management is to constantly check that evisceration is being done to the highest possible standards and that carcasses are being rinsed immediately afterwards, preferably in a spray tunnel.

When wet chilling is practised the carcasses then pass through the spin chillers. It should be noted that this operation is to cool carcasses, not to wash them and carcasses entering the spin chillers should be as clean as possible.

Having said this, in some countries chlorine is added in the spin chiller water to reduce bacterial numbers. If this is practised then two things should be remembered – firstly, if too much chlorine is added carcasses will be discoloured and, secondly, high levels of organic debris adversely impact on the chlorine's ability to be effective.

The higher the temperature the faster bacteria grow and multiply. So the other thing we want to do in processing and then in portioning is to cool the carcass as quickly as possible and keep it cool.

By the time the carcass leaves the spin chiller (or air chillers) its deep meat muscle temperature should be 4°C or less.

In essence, the microbiological (salmonella) management in the processing plant can be summarised as follows:

**Get it clean, keep it clean.
Get it cold, keep it cold.**

An inherent advantage of the poultry abattoir is that until birds go into the spin chiller in the case of wet chilling or the packing or portioning rooms in the case of air chilling the birds have been kept in sequence by being on shackles.

That is we have maintained FIFO (First In, First Out) and so no one carcass stays in the working environment longer than any other.

When we get into portioning or packing this discipline can be lost so an important supervisory responsibility is to ensure the maintenance of FIFO! If a carcass experiences FILO (First In Last Out) then it will have had the opportunity to warm up and its bacterial (salmonella) population may be greater than a FIFO carcass.

If you summarise the above it is all about people management and ensuring that your processing staff do what they should every minute of every shift and that your supervisors regularly check everything that should be checked. The problem is people are human! ■