

Instant assessment of hazards from raw meat

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In food law enforcement 45% of infringements are due to failures in general hygiene standards and 37% of all infringements are due to microbiological contamination.

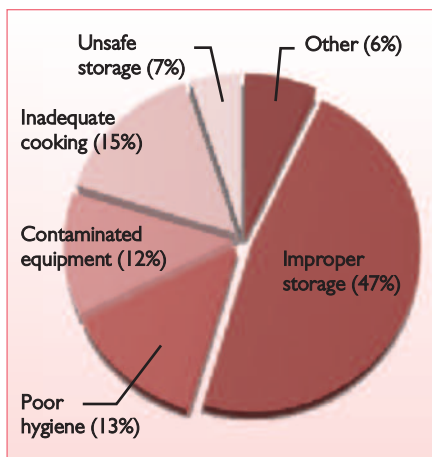
Meat and fish products have the largest number of microbiological infringement (29%) compared to all other foodstuffs and they present the largest single food safety hazard due to the presence of potentially pathogenic bacteria.

It has been calculated that every 1% reduction in the incidence of foodborne disease in the UK extrapolates to 10,000 fewer cases each year with a saving of £15 million.

Table 1 shows some statistics from 2008 including a dramatic rise in the incidence of campylobacter particularly in raw chicken, and the high mortality rate associated with relatively small numbers of cases from *Listeria monocytogenes*. A key element in most cases is cross contamination from raw foods.

Fig. 1 shows that 25% of food poisoning is caused by poor hygiene and contaminated equipment and 15% is due to inadequate cooking. Cross contamination and microbial adulteration are also the direct results of unsafe and improper storage (54%).

Fig. 1. Food poisoning incidents can arise from a variety of causes.



Organism	No. cases	No. deaths	Deaths (%)	Cause/source
Salmonella	26,962	77	0.3	Raw meat/poultry/cross contamination
<i>L. monocytogenes</i>	358	126	35.2	Chilled ready to eat foods
<i>E. coli</i> O157	1054	23	2.2	Raw meat/poultry/cross contamination
Campylobacter	321,179	76	0.0	Raw meat/poultry/cross contamination
<i>Cl. perfringens</i>	52,530	55	0.1	Prepared and ready to eat foods
Norovirus	201,279	32	0.0	Shellfish

Table 1. Foodborne illness statistics 2008.

In recent years, major food poisoning incidents have led to severe injury and death due to *E. coli* O157 from the manufacture and supply of meat products. In these cases severe penalties were imposed on the manufacturer.

Clearly raw meat posed a major hazard to health and must be managed effectively with rigorous enforcement in order to protect both the consumer and the manufacturer. Preventing food poisoning is a key focus of any food safety system. Good hygienic practices and effective segregation of raw and cooked areas are primary preventative controls measures for all meat processors.

Hygiene monitoring provides an early warning of potential problems and also generates evidence of due diligence. Rapid objective test methods enable enforcement of high standards and permit immediate corrective action, thus minimising the potential risks. Optimising cleaning programs also reduces costs (both in materials and labour time), reduces environmental waste and improves product quality and shelf life.

Measuring cleanliness

Visual assessment of cleanliness is subjective, insensitive, and unreliable to detect the invisible hazards associated with raw meat.

Meat residues carry potential pathogens, and if the residue is not effectively removed then they can support the growth and survival of the pathogens.

Simple rapid detection methods can be used that measure natural components of meats, for example, SystemSURE Plus detects adenosine triphosphate (ATP) and



gives a very sensitive numerical result in 15 seconds. ProClean detects protein residues in 10 minutes as a simple colour change from green to purple but is less sensitive.

These methods are very useful in demonstrating the general level of cleanliness but they cannot qualify the type of hazard that is present nor indicate its source. By contrast, microbiological methods can detect low numbers of specific pathogenic bacteria but require a skilled analyst in a laboratory to give results in 1-5 days, which is often impractical and too expensive in the modern world of fast moving consumer goods.

More recently, rapid microbiology tests such as MicroSnap have provided simpler and faster results but a working day of seven hours is still required.

A new test has been developed to detect a specific component of raw meat and fish

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residues that gives a numerical result in 2-5 minutes. CrossCheck detects a characteristic enzyme found in raw meat and fish using a new bioluminescent test system (EnSURE). The test procedure is simple and easy. Swab the test area, activate the device with a snap and squeeze action, incubate at room temperature or in an incubator, and read the result in the luminometer for 15 seconds.

The test is very sensitive and can detect as little as 0.01% raw chickens when incubated at 37°C for five minutes (Table 2).

It can detect a wide range of raw products such as chicken, beef, pork, salmon, and prawns and when these products are cooked, the characteristic enzyme is destroyed.

Therefore, Crosscheck not only detects

Table 2. Sensitivity and limit of detection of CrossCheck.

Dilution of raw chicken	CrossCheck response (RLU)
10%	5760
1%	2130
0.1%	209
0.01%	75
0.001%	23
Negative controls	
● No chicken	24
● Cooked chicken	26

the presence of contamination but demonstrates that it is from raw meat residue and hence the severity of risk is much greater.

Accordingly CrossCheck has several applications:

- Surface cross-contamination test to verify the effectiveness of cleaning procedures.
- Surface cross-contamination test to verify effectiveness of barrier systems in maintaining segregated areas between raw and cooked operations. The test can detect raw chicken residues on surfaces even after seven sequential transfers by hand.
- Heat processing verification test to determine that meat products have been thoroughly cooked.

It can be used by caterers, butchers, food processors, quick service restaurants, food retailers and supermarkets as well as food inspectors and auditors.

Raw meats are high risk ingredients that need careful handling and processing to eliminate food safety hazards.



Inadequate cooking, cross contamination and poor hygiene together typically cause 40% of food poisoning incidents. CrossCheck can monitor all these critical control points and provide additional information about the severity of the risk to the food process operation.

The combination of CrossCheck with other simple rapid hygiene monitoring methods, such as ATP, provides a convenient, cost effective package for food safety management.

These rapid tests provide additional information in a timely manner to supplement food safety programs by facilitating immediate corrective action and the avoidance of expensive (potentially life threatening) mistakes.

Results provide evidence of due diligence, optimising manufacturing processes and reducing costs, whilst providing a product quality dividend. ■