Putting residues and chemicals into a current day context

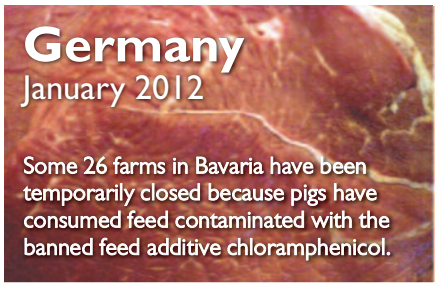
This article reflects, in general terms, on the subject of chemicals and residues in meat and fish to provide a good background briefing on the subject.

A residue is 'that which remains' and can refer to products and their breakdown products from substances intentionally given to the animal, such as medicines, or products and their breakdown products from substances the animal has unintentionally consumed. An interesting example of this is mercury in tuna and the debate that ensued a couple of decades ago.

Sometimes, residues can have an adverse effect on the person consuming the meat or fish, but in other situations they are of no consequence. For example, heat labile residues can be broken down into harmless products by the cooking process. Some of the pathological effects in man attributed to consuming foods contaminated with antibiotic residues are detailed in Table 1.

However, there are two other dimensions to residues that warrant consideration at this stage and these are consumerism and legislation.

As far as consumers are concerned, words like 'chemical' and 'antibiotic' are perceived very negatively. So, they expect the foods they eat to be free of them, irrespective of any scientific data supporting the fact that a particular substance is not harmful to the consumer!



As far as legislation is concerned, we need to appreciate that it is consumer driven. Legislators are there to 'serve the public', but may err on the side of caution when it comes to protecting their political careers. Legislation can therefore arise from scientific fact or strong public opinion.

Irrespective of what we feel about legislation, we need to respect it and adhere to the requirements it places upon us. One aspect of legislation we need to be aware of is that it often specifies limits for a particular substance or residue. What does this mean? The phrase 'there are lies, damn lies and statistics' come to mind!

Many people, including enforcement officers take a figure literally at its face value. If the legislation states that levels over 100µg per kg are unacceptable they view a result of 101µg per kg as illegal, yet the test may have a sensitivity of ± 5% which to a scientific mind straightaway says that results between 100 and 105µg per kg should be treated with extreme caution.

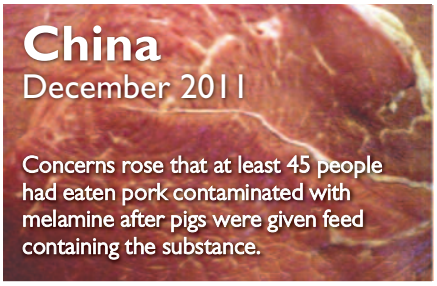
Then there are all the issues and questions associated with sampling and how representative the sample is of the product or batch of product being tested.

Furthermore, are we happy as to whether the substance being tested for is homogeneously or heterogeneously distributed in the food.

A good example of heterogeneous distribution can be mycotoxins in maize or peanuts when the levels of mycotoxin are much higher in damaged, fungus infested grains or nuts. Then the value of any test result is very much dependent on the number of such grains or nuts that get into the sample sent for laboratory testing.

Table 1. Some of the pathological effects in man attributed to consuming foods contaminated with antibiotic residues.

- Transfer of antibiotic resistant bacteria to man.
- Immunopathological effects.
- Autoimmunity.
- Carcinogenicity.
- Mutagenicity.
- Nephropathy.
- Hepatotoxicity.
- Reproductive disorders.
- Bone marrow toxicity.
- Allergy.



Another example is the case when one batch of chemically contaminated prawns got mixed into a much larger quantity of uncontaminated prawns during processing.

Also, some residues are preferentially accumulated in the fat so the laboratory test result for that chemical will be proportional to the amount of fat attached to the sample of meat to be tested.

If we take all this into account we can see how a test result could differ by 50%, a 100% or even more from the real amount of chemical present in the sample tested.

So, if we ever get into a situation where we are going to court your experts and lawyers need to fully explore the issue of the real significance of the test results presented by the other party!

Chain of production

When it comes to chemicals and residues, we need to fully understand the production chain of our product from the farm to shipment of it from our facility. We must identify possible sources of chemicals and residues and identify controls that we want to have in place to prevent or manage these inputs.

Obviously, we can have much tighter controls over farmed animals or fish than we can from those caught in the wild. Also, we can have tighter controls over intensively farmed animals, such as pigs and poultry, than we can over extensively farmed animals such as free range broilers or turkeys and moorland grazed sheep or cattle.

Chemicals vary in their ability to remain in an animal's body. The time taken for half of

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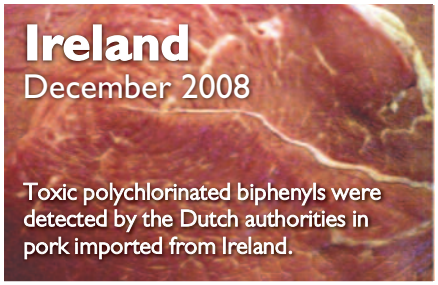

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the chemical to be removed from an animal's body is known as its half-life. The shorter the half-life, the quicker the substance is removed.

Some chemicals have a very long half-life and these are also known as persistent chemicals. Obviously it is important to ensure animals do not consume such chemicals as their meat can be contaminated by these chemicals for years, or even decades, and during such periods is unfit for human consumption.

Such chemicals include organochlorine pesticides such as aldrin, BHC, chlordane, DDT, dieldrin and the like, polychlorinated biphenyls and heavy metals such as lead, arsenic and cadmium. Some of these breakdown very slowly!

Table 2. Examples of key questions for use in a risk assessment for persistent chemicals.

- Have organochlorine residues ever been found in animals/meat products or in the soil or other samples from this farm?
- Do animals have access to areas where crops could have been treated with a persistent chemical?
- Do animals have access to timber buildings, wooden posts etc that could have been treated for termite infestations or painted with a lead based paint?
- Is there an old (in use or redundant) dip or spray race? Some old sheep dips contained arsenic and land around old dips/ races may be contaminated. Many dips used in the 1980s contained organochlorine compounds and high levels persist in the soil.
- Do animals have access to the rubbish tip?
- Do animals have access to former chemical stores, fertiliser stores or washdown areas?
- Do animals have access to leaking transformers, capacitors, hydraulic equipment of slag (coal mine waste)?
- Is animal feed, including hay and straw, stored in silos, sheds, barns that may have been previously treated with a persistent chemical?

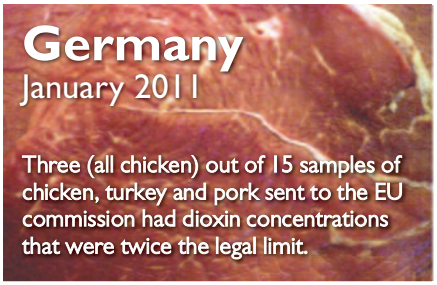
The sort of questions that should be asked in a risk assessment of persistent chemicals are shown in Table 2.

Veterinary chemicals including antibiotics and pesticides are an important group of chemicals to consider as a possible source of chemical or residue contamination of meat.

If antibiotics are used the withholding time (the time between cessation of treatment and slaughter) must be adhered to or exceeded.

Every farm should keep a record of all medications held and details of every administration to an animal.

We also need to be sure that animals can not accidentally consume antibiotics, for example through contaminated feed or having licked clean discarded antibiotic containers.



Chemicals and residues are an important topic for those associated with meat processing and this is highlighted by the inset boxes which give some recent and topical examples of this problem. ■

Slicing at the next level

The Al Nabil Company for food products is the leading producer of chilled and frozen food products in the Middle East and Gulf region and produces a wide range of cold cuts for the retail market.

Business has been going well for the Jordanian company and their product range and throughput have grown steadily.

Production of beef pastrami, Italian salami, dry salami, pepperoni, smoked roast beef and mortadella has doubled in the last 12 months.

A major reason for this success is the recently installed Marel PolySlicer 1000. This machine has taken over slicing of all small-diameter products, such as salami, from two existing machines. The company has opted for an involute blade head, because it can cut at twice the speed of the existing machines – at a similar cost.

A Marel technician supervised the machine's installation at the plant. He also trained Al Nabil's operators on how to use the machine, which proved to be a major benefit.

"The service and training from Marel was very good. It helped us to quickly integrate the machine into our daily production and now we are running many of our products on it – amounting to around three tonnes per day," Salah Al-Johari, production manager at Al Nabil, told International Meat Topics. "We are very happy with the new PolySlicer 1000. The machine is stable, our operators find it easy to use, the quality of our products is excellent and it has helped us double our throughput. It is the perfect machine for our needs."

PolySlicer 1000 is a compact, versatile machine that is easy to use for slicing cold cuts. It produces well defined stacks, shingles or shaved products at speeds up to 1500 revolutions per minute. It can slice a very wide range of cooked meats, bacon and natural products. The slicer is designed and engineered for high reliability and low maintenance.

PolySlicer 1000 can operate as a stand-alone unit or it can be integrated with a range of manual, fixed or random-weight production lines.

✉ tony.ambrose@marel.com