What are Dioxins and PCB’s:
Dioxins are colourless, odourless organic compounds containing carbon, hydrogen, oxygen and chlorine. Dioxins are ubiquitous environmental contaminants that have been found in soil, surface water, sediment, plants and animal tissue worldwide. They are highly persistent in the environment.

PCB’s or Polychlorinated biphenyls, are chlorinated aromatic hydrocarbons and are produced by the direct chlorination of biphenyls. Like dioxins PCB’s are widespread environmental contaminants and are very persistent in soil and sediments.

Dioxins and PCB’s have a broad range of toxic and biochemical effects and some are classified as human carcinogens.

Occurrence in Foods:
Dioxins and PCB’s enter the food chain through a variety of routes. Grazing animals and growing vegetables may be exposed directly or indirectly to these contaminants in the soil.

Leafy vegetables, pasture and roughage can also become contaminated through airborne transport of dioxins and PCB’s.

A significant percentage of paper food packaging materials also contain PCB’s which have the potential to migrate to the packaged food.

Extensive stores of PCB-based waste industrial oils, many with high levels of PCDFs, exist throughout the world. Long-term storage and improper disposal of this material may result in dioxin release into the environment and the contamination of human and animal food supplies.

Effects on Health:
Humans accumulate dioxins in fatty tissue mostly by eating dioxin-contaminated foods. The toxicity of dioxins is related to the amount accumulated in the body during the lifetime.

Short-term exposure of humans to high levels may result in skin lesions, such as chloracne and patchy darkening of the skin and altered liver function.

Long-term exposure is linked to impairment of the immune system and the developing nervous system, the endocrine and reproductive functions.

The developing foetus is the most sensitive to dioxin exposure. New-born with rapidly developing organ systems may also be more vulnerable to certain effects.

Control and Preventive Measures:
Most of human exposure to dioxins is through the food supply, mainly meat, dairy products, fish and shellfish. Protecting the supply chain is one of the most important factors.

Food and feed contamination monitoring systems must be in place to ensure that tolerance levels are not exceeded.

Avoid those areas with increased dioxin contamination due to local emission, accidents or illegal disposal of contaminated materials that are used for grazing or for the production of feed crops. If possible, contaminated soil should be treated and detoxified or removed and stored under environmentally sound conditions.

Monitor compliance with nationally-established guideline levels or maximum levels, if available, and minimize or decontaminate non-complying feed.
### Limits for dioxins and PCBs set out in EC regulation No. 1881/2006

<table>
<thead>
<tr>
<th>Foodstuff</th>
<th>Maximum levels (sum of dioxins)</th>
<th>Maximum levels (sum of dioxins and dioxin like PCBs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat from Bovine animals and Sheep (excluding edible offal)</td>
<td>3.0 pg per g of fat</td>
<td>4.5 pg per g of fat</td>
</tr>
<tr>
<td>Meat from Poultry (excluding edible offal)</td>
<td>2.0 pg per g of fat</td>
<td>4.0 pg per g of fat</td>
</tr>
<tr>
<td>Meat from Pigs (excluding edible offal)</td>
<td>1.0 pg per g of fat</td>
<td>1.5 pg per g of fat</td>
</tr>
<tr>
<td>Muscle meat of fish and fishery products (excluding eel)</td>
<td>4.0 pg per g wet weight</td>
<td>8.0 pg per g wet weight</td>
</tr>
<tr>
<td>Hen Eggs and Egg products</td>
<td>3.0 pg per g of fat</td>
<td>6.0 pg per g of fat</td>
</tr>
<tr>
<td>Vegetable oils and fats</td>
<td>0.75 pg per g of fat</td>
<td>1.5 pg per g of fat</td>
</tr>
</tbody>
</table>

### USA :: FDA

There are no tolerances or other administrative levels for dioxins in food or feed in the USA and the FDA considers all detectable levels to be of concern. Action levels have been set for PCBs in red meat and fish. Temporary tolerances have been set for animal feeds and paper packaging as per below.

- 0.2ppm in finished animal feed for food producing animals (except the following finished animal feeds: feed concentrates, feed supplements and feed premixes.
- 2 ppm in animal feed components of animal origin, including fishmeal and other by-products of marine origin and in finished animal feed concentrates, supplements and premixes intended for food producing animals.
- 10ppm in paper food packaging material intended for or used with finished animal feed and any components intended for animal feed. The tolerance shall not apply to paper food-packaging material separated from the food therein by a functional barrier which is impermeable to migration of PCB's.

### Contamination Incidents

<table>
<thead>
<tr>
<th>YEAR</th>
<th>LOCATION</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>USA</td>
<td>FDA found contamination of animal feeds with dioxin which resulted in elevated levels of dioxin in chicken, eggs and catfish.</td>
</tr>
<tr>
<td>1999</td>
<td>Belgium</td>
<td>High levels of dioxins were found in poultry and eggs. The cause was traced back to animal feed contaminated with illegally disposed PCP-based waste industrial oil.</td>
</tr>
<tr>
<td>2008</td>
<td>Ireland</td>
<td>Recall of many tons of pork meat and pork products when up to 200 times the safe limit of dioxins were detected in samples of pork. Contamination was traced back to contaminated feed.</td>
</tr>
</tbody>
</table>

### SUMMARY TABLE

**Occurrences in food**
- Grazing animals and growing vegetables
- Leafy vegetables, pasture and roughage
- Fish

**Effects on health**
- Short-term:: Skin lesions
- Long-term:: Impairment of immune system
- Long-term:: Impairment of the developing nervous system

**Control**
- Protect and monitor supply chain
- Monitor compliance with applicable legislation
- Avoid growing in areas where there is increased dioxin contamination

**Published Risk Assessments**
References

5. Dioxin. 2018. Dioxin. [ONLINE] Available at: https://www.fda.gov/AnimalVeterinary/Products/AnimalFeedFeed/FoodIngredients/ucm504320.htm [Accessed 01 October 2018]