Quaternary Ammonium Compounds
MAH White Paper

Executive summary
Quaternary Ammonium Compounds, also known as QACs or Quats are a group of compounds including Didecyl Dimethyl Ammonium Chloride and Benzalkonium Chloride. They have been a common ingredient in many farmyard sanitisers for years, thanks to their disinfecting properties.

Advantages to Quats include low odour and toxicity compared to other active ingredients, plus good tolerance to a wide range of pH conditions. They are suitable for multiple tasks, being non-corrosive to metals. However, they leave a sticky residue after application which, in recent years, has been recorded at higher levels than agreed defaults. Side effects of human exposure to Quats include: skin and respiratory irritation, allergic reactions, caustic burns, nausea and vomiting. More serious repercussions are possible for people with compromised immune systems.

Serious concerns have been expressed across the farming and food production industry over the continued use of Quats and their effect on the supply chain. Earlier this year, milk processor, Arla announced they will no longer accept any milk that has come into contact with Quats at any point in the supply chain from 1 July 2014 onwards. UK dairy sites have followed suit.

All products developed and manufactured by MEDSA Animal Health contain no Quats whatsoever. We omit peracetic acid and antibiotics too, and at the time of writing, it is believed that we are the only UK company that does not include Quats in its cleansing products - making us a unique choice for farm sanitisation.

Quaternary Ammonium Compounds
For a long time, Quaternary of Ammonium Compounds, also known as QACs or Quats, have been included in all kinds of products, from sanitisers to polyurethanes. Their disinfecting properties have made them a popular ingredient, used for a number of farmyard tasks.

However, more recently, residues have found their way onto plant products in several countries at levels higher than those initially agreed by the industry. As a result, guidelines have been put in place to monitor the use of Quats and concerns have been expressed over their continued use and effect on the whole food chain.

This article looks at how and why Quats have been used in the farming industry, the risks involved and other methods of sanitisation.

A description of Quats
Quats are a group of compounds including Didecyl Dimethyl Ammonium Chloride (DDAC) and Benzalkonium Chloride (BAC). In slightly more scientific detail, they are derivatives of ammonium compounds, (NH₄⁺)Y⁻, in which all four of the hydrogens bonded to nitrogen have been replaced with hydrocarbyl groups, or univalent groups formed by removing a hydrogen atom from a hydrocarbon like ethyl or phenyl.

First uses of Quats as a disinfectant date back to 1916, although it was not until 1935 that it was discovered that they had excellent bacteria-killing properties. Used alone, they work reasonably well as a sanitiser,
but combining them with a compatible non-ionic detergent will increase their efficacy. Normally non-corrosive, overly-strong concentrations could corrode mild steel or iron.

**Benefits of Quats**

Quats are widely available and are an effective sanitiser and disinfectant, thanks to their antimicrobial effects. Their use has been licensed within the food industry specifically as a plant protection product or as a biocide for disinfection.

Advantages to using them include low odour and toxicity compared to other active ingredients, as well as a good tolerance to a wide range of pH conditions, making them versatile and suitable for a broad range of tasks. Quats are non-corrosive to metals and don’t bleach textiles, although they must be diluted to the right strength to gain optimum efficacy and to prevent too strong a mixture from causing damage.

Unlike their bleach-based counterparts, Quats need longer contact with a soiled surface to work, with some products advising waiting at least ten minutes before wiping them off. Advice is also given to rinse surfaces treated with Quats before bringing food into contact with them. This is due to the sticky residue that can be left behind after the application.

**Adverse effects and risks to health from Quats**

Despite their propensity to leave a sticky residue after application, using Quats as a disinfectant on farms was never expected to have a direct impact on food produced or reared on the premises. Therefore, specific maximum residue levels were never fixed - a default level of 0.01 mg/kg was applied instead.

In recent years, however, such residues, have been recorded at much higher levels than the agreed defaults in several countries. Potential causes of residue coming into direct contact with plant products are multiple, from contaminated water being used for irrigation or crop spraying to cross contamination from equipment (e.g. milking machinery) disinfected with Quats. Migration of surface residue to food products has also happened with alarming frequency, for example wooden boxes treated with antifungal products and then used to store fruit and vegetables.

Some of the side effects for human health caused by the use of Quats on farms include: skin and respiratory irritation, allergic reactions, caustic burns, nausea and vomiting. More serious repercussions are possible for people with compromised immune systems, while prolonged exposure to Quats has also been linked to asthma and changes in lung function.

**Industry reaction to Quats and residues in the supply chain**

As a result of these higher residue level discoveries and serious threats to human health, the Standing Committee of the Food Chain and Animal Health put firmer guidelines in place in July 2012 to monitor the use of Quats and to temporarily adjust the maximum residue levels to ensure greater safety in all food and feed of plant origin. Levels have been adjusted again since then, however, they remain much tighter than those originally put in place as a default.

Serious concerns have been expressed across the farming and food production industry over the continued use of Quats and their effect on the supply chain, including the farmer, haulier and dairy.

Earlier this year, major milk processor, Arla announced that they will no longer accept any milk that has come into contact with Quats at any point in the supply chain from 1 July 2014 onwards. Dairy sites within the UK have followed suit, introducing a policy banning any substances that may come in contact with milk and that contain DDAC or BAC.
Testing for the presence of DDAC and BAC is also being considered for inclusion in the National Due Diligence programme managed through Dairy UK and paid for by the milk industry (including Arla). This scheme already tests for the presence of pesticides, lead and other toxic substances.

**The MEDSA Animal Health Method**

All sanitising products from MEDSA Animal Health are manufactured without Quats. We comply fully with industry-led demands for safer cleaning solutions.

We omit peracetic acid and antibiotics too, and at the time of writing, it is believed that we are the only UK company that does not include Quats in its cleansing products - making us a unique choice for farm sanitisation.

Our products rely on a different formula and action to kill germs, bacteria and bugs. This is just as powerful as using Quats, but it has the added benefit of leaving no residues or taints. Our products have a shorter dwell time too, and are safer to handle. Farmers can rest assured that they are fully compliant and prepared for any changes in the law or demands from customers regarding Quats.

We work with experts to create non-toxic, highly effective sanitisers. Find out more about MEDSA Animal Health at: www.medsaanimalhealth.com
References:


(5) MAH briefing document: details TBC


