Antibiotics – how do you comply with the legislation?

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From the discovery of Penicillin in 1928, the use of antibiotics in medicine has grown exponentially. It was also recognised fairly early on that these drugs could significantly increase food production, leading to their wide scale use in feed or by injection for animal production. This practice has broadly been cited as the main reason behind the rise of antibiotic resistant strains of bacteria that are leading to increasing numbers of deaths in humans. In 2014, The Centre for Disease Control in the US estimated that at least 23,000 Americans a year die from drug resistant bacterial infection every year.

The potential for antibiotics used in intensive farming to cause health risks was recognised in the EU as far back as the early 1950s, soon after the drugs were first approved as antibiotic growth promoters (AGPs). The Swann Committee was formed by the UK government in response to the discovery of transferable oxytetracycline resistance from food animals to Salmonella enterica Serovar typhimurium.

Tough legislation

In 1969, the Swann committee called for limited use of antibiotics in farming to reduce the risk of resistance to drugs used in human medicine. Its recommendations led to the withdrawal of penicillin, streptomycin, and tetracyclines from the list of authorised AGPs in many European countries in 1972-1974.

In 1986, Sweden, followed by Denmark, the UK and then other European countries all banned the use of non-essential antibiotics in food animals. Some of these bans were closely monitored from the beginning while others were not fully enforced initially.

The legislation in Europe for the presence of antibiotics in food and feed is among the toughest in the world. This can make it increasingly difficult for products from other parts of the world to meet EU standards and therefore trade with the EU. The BBC reported in May 2014 that there are increasing concerns that a new US-EU trade deal may lead to a watering down of current tougher EU laws on the use of antibiotics in the production of food. At the same time there is growing pressure from within the US to bring about change in the agricultural industry and follow the EU's example by introducing similarly tough antibiotic legislation.

Whichever way legislation goes, the requirement to accurately measure levels of a broad range of antibiotics in food and feed products still remains. There is a need for a range of testing solutions to suit different levels of testing, in-house expertise, facilities and commodity type. Companies like R-Biopharm offer a range of different test formats.

Broad spectrum screening

The PremiTest antibiotic residue screening test detects a broad range of the most relevant and regulated antibiotic compounds including lactams, cephalosporins, tetracyclines and quinolones in meat (beef, pork, poultry), fish and shrimps. This test is simple enough to be used on-site by farmers, slaughterhouses, meat processors, fisheries, etc, while being accurate enough for use by official laboratories.

This kit has been performance tested by the AOAC. It is also used in surveillance programs in France (to conform with general legislation), Germany (to conform with directive 2002/657/EC), Russia (no.14.6/01921), Belgium, Slovak Republic, Czech Republic, Serbia, Hong Kong, Taiwan, Albania and South Africa. China has even selected it as the national standard test used by the Shanghai enter-exit Inspection and Quarantine Bureau.

PremiTest offers a very flexible testing platform with the ability to test numerous samples at any one time. A simple colour change determines the absence of a broad range of antibiotics, while no change in colour indicates the presence of antibiotics, requiring further investigation. In contrast to conventional methods, reliable results are available in less than four hours and may be objectively determined using the PremiScan reader.

R-Biopharm have developed a number of accurate ELISAs with corresponding spiking solutions for a wide range of individual antibiotics or antibiotic groups. This platform provides an increased sample throughput with accurate quantitative results in as little as one hour 15 minutes.

The February 2014 issue of Food Chemistry 145: 593-598 Jester et al., from the US Food & Drug Administration (FDA) published an endorsement of Ridascreen ELISA kits for use in Nitrofuran screening of aquaculture products. The reactions are measured using a photometer and RidaSoft Win software, both available from R-Biopharm.

Immunoaffinity columns

New to the market, Easi-Extract Chloramphenicol enables specific clean-up of some of the most difficult commodities for analysis by LC-MS/MS or HPLC. Monoclonal antibody technology isolates and purifies chloramphenicol from commodities like meat. This highly effective method reduces the amount of background interference and ion suppression, often found with LC-MS/MS, while removing the need for matrix matched standards, allowing accurate quantification of any chloramphenicol residue in a sample. Total extraction and clean-up time takes as little as 20 minutes. A single sample can be analysed or these columns can be automated for the large-scale analysis of samples.

All of these testing solutions available from R-Biopharm have been designed to easily integrate into existing quality control systems. They offer very sensitive antibiotic detection that exceeds the minimum required performance limit (MRPL) for the antibiotic, or group, of interest.

When compared to outsourcing the analysis of samples, they provide very fast and cost effective methods to measure antibiotic residues and in many cases can be used without the requirement for heavily investing in complex and expensive technology.

Whether you have a small bench space for a few analyses or a large laboratory dedicated to analysing hundreds of samples for the presence of antibiotics, R-Biopharm can offer the ideal testing solution supported by reliable equipment and software where necessary.

By using the different test formats available at various points in the food chain, farmers, food companies and testing laboratories can help to prevent further issues with antibiotic resistance and help preserve the effectiveness of current antibiotics. ■