

Columbia Food Laboratories, Inc.

quality analytical services for the food industry



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TechNote P8500 - Antibiotics Profile for Honey

Introduction

Columbia Food Laboratories has a new analytical profile for detecting residues of several classes of antibiotics in honey: fluoroquinolones, sulfonamides, macrolides, amphenicols and tetracyclines. In the USA only tylosin and oxytetracycline are approved for control of American foulbrood in bees. Other antibiotics have been illegally used and considerable testing is performed by the honey industry in an attempt to detect this usage. Antibiotic testing can be quite expensive due to the differences in chemistry and methods used to analyze for the various types of compounds. Fortunately, advances in lab instrumental technology can go a long way towards solving this problem by allowing for the detection of multiple categories of antibiotics at the same time, thereby helping to lower the cost of testing.

Although a number of compounds can be detected by this profile, there remain two important antibiotics for which we need to run separate analyses. The detection limit required for chloramphenicol is much lower than can be measured with this profile, therefore, we have two individual methods available for it. The other antibiotic, streptomycin, has chemical properties so different from those in the P8500 profile that it is difficult to establish analytical conditions that work for it without degrading analytical conditions for the other compounds in the profile.

Analytical Methodology

For the compounds in the P8500 profile we use HPLC/MS/MS. We plan to expand this profile with additional antibiotics whenever possible. The list of compounds in this profile are shown on the reverse side, along with the detection limits. At this time it is only available for honey (not wax, propolis, etc.).

For chloramphenicol, two test methods are available: ELISA and HPLC/MS.

ELISA (enzyme-linked immunosorbent assay)

This is a quantitative screening method with a lower detection limit of 0.3 ppb. Due to the nature of this type of assay, false positives are a slight possibility. False negatives are less likely. We have found a few instances where this method has given a false positive result in honey at or below the 1 ppb level, although recent improvements in the ELISA kits seem to have reduced this possibility. We consider it to be a good, inexpensive method for screening honey for CAP.

HPLC/MS (high pressure liquid chromatography / mass spectroscopy)

This is a highly specific quantitative method with a minimum quantitation limit of 0.3 ppb. We use high resolution time-of-flight MS (TOF-MS), therefore, the identification of CAP can be made with much greater certainty. This method is sometimes used as a test upgrade to confirm samples which test positive by ELISA, or, as the primary approach for testing higher value samples. Due to the additional time required for sample preparation and high cost of instrumentation involved, this method is more expensive to perform.

For streptomycin, we use an ELISA method. We believe it gives reliable results and is also relatively inexpensive to perform.

Testing Strategy

Any one, or combination, of the above tests for antibiotics may be requested (for example, CAP by ELISA and P8500). The amount of sample needed for all of the above analyses is approximately 25 grams.