

## Meat Speciation Technical Sheet

In order to prevent the spread of BSE, many countries have imposed restrictions, and even outright bans, on the use of ruminant by-products and proteins in feed for ruminants. Some jurisdictions have banned all animal proteins from use in animal feeds. In the U.S., FDA guidelines, outlined in CFR 589.2000, adopted in 1997, prohibit the feeding of mammalian protein to ruminant animals. Ruminants are animals that have a four-compartment stomach, such as cattle, sheep, goats, deer, elk and bison. In Europe even stricter regulations have been put in place that prohibit the presence of most animal proteins in feed.



### ANALYTICAL PROCEDURES

The identification of prohibited materials can be achieved by PCR testing for the presence of the DNA from a particular animal species or by ELISA testing for protein from mammals or more specifically, for protein from ruminants. GeneScan can perform a broad range of tests to identify prohibited materials from particular animal species or animal groups in feed, feed ingredients and other products.

### POLYMERASE CHAIN REACTION

This analytical procedure is based on the identification of species-specific DNA. While immunological methods may fail when applied to processed materials, because their respective target proteins may be degraded or denatured, the analysis of species-specific DNA sequences works even if the DNA is denatured and / or partially degraded. Together with the presence of DNA in all tissues (liver, brain and muscle) and materials (e.g., milk and blood), this makes DNA the preferred analyte in many processed materials.

To perform these analyses, DNA is extracted from the sample and purified. Using that purified DNA GeneScan is able to perform a variety of PCR methods:

- GeneScan also uses proprietary Real-Time PCR tests for bovine, ovine, porcine and caprine DNA. Analysis and visualization is done in real time with no need for subsequent electrophoresis. Validation trials have determined sensitive detection of the respective animal species without cross-reaction with other species. Please inquire regarding our PCR tests for further animal groups or species or particular PCR tests recommended or required by applicable regulations.
- RFLP (Restriction Fragment Length Polymorphisms) PCR methods, which amplify and detect e.g. the animal-specific cytochrome b gene target, are useful to detect animal DNA from a variety of animals including deer, horse, buffalo, etc. These methods consist of standard PCR followed by an enzymatic digestion of the amplified DNA fragment. The enzymatic digestion cuts the amplified fragments in different patterns according to species. Due to possible interference between patterns, the applicability of RFLP to samples containing a mixture of DNA from different animal species is limited.

### IMMUNOASSAY

The Immunoassay methodology detects ruminant protein or more generally mammalian protein in meat and bone meal, feed, and feed ingredients. These tests target specific proteins found only in ruminants or mammals, respectively. GeneScan performs various tests of this kind, most of them in a lateral flow double sandwich format that allows for qualitative analysis. Both an immobilized and a free antibody that migrates along the test strip together with the test solution have to interact with target protein from the sample in order to give a positive test signal. Detection limits may vary depending on the particular test applied.

### CONSULTING SERVICES

Each year millions of tons of ruminant processed animal protein (PAP) are produced in the U.S., primarily destined for non-ruminant feed. There is risk of cross contamination during production, shipment or at end-use feed lots. Testing alone is not an effective solution to controlling prohibited materials in a feed operation. GeneScan can provide assistance to help companies design proactive programs to efficiently monitor their operations and minimize the risk posed by the accidental inclusion of ruminant PAP into ruminant feed.