RACTOPAMINE BY LC-MS/MS

DESCRIPTION

Ractopamine is a beta adrenergic receptor agonist (simply called beta-agonist) drug added to animal feed to increase muscle mass and stimulate muscle leanness notably in pork, cattle, and turkeys. Ractopamine levels in muscle and organs can be accurately measured using LC-MS/MS.

CHEMISTRY

Ractopamine, 4-[3-[[2-hydroxy-2-(4-hydroxyphenyl)ethyl]amino]butyl]phenol, mimics the effects of adrenaline and increases the speed of protein synthesis in the body resulting in more muscle and less fat. Ractopamine is typically added to animal feed a few weeks before the animal is slaughtered where the animal rapidly grows while consuming less feed. This promotes increased amounts of leaner meat in the animal.

REGULATIONS

Currently, ractopamine is not allowed or restricted in some countries including the European Union, China, Russia, and Taiwan. To demonstrate compliance when shipping meats to these countries, USDA oversees the Laboratory Approval Program of Meat and Poultry Products (LAP) that sets a maximum allowable ractopamine residue of 0.1 ppb.

The US regulatory limit for ractopamine in meats is 50 ppb. USDA also allows labeling meats as "Never Fed Beta Agonists" where the supplier's quality program shows the animal feed did not contain beta-agonists including ractopamine. Testing by approved laboratories is a part of that program (FSNS is a USDA approved lab). A summary of these programs and approval processes can be found at:

https://www.ams.usda.gov/services/lab-testing/las-export-program

https://www.ams.usda.gov/services/imports-exports/beta-agonists

International food trade uses standards and guidelines of Codex Alimentarius, the central part of the Joint FAO/WHO Foods Standard Programme. This association has set a ractopamine residue limit in meats of 10 ppb.

Ractopamine usage in Canada is low and the Canadian Food Inspection Agency (CFIA) has a Ractopamine-Free Certification Program where the supplier demonstrates their program specifics that the animals never came in contact with ractopamine. Testing of samples is done to verify program effectiveness.

In countries where ractopamine is not specifically regulated such as Australia, no detectable levels are allowed.

ASSAY PRINCIPLE AND APPLICABILITY

The analytical method is based on USDA CLG-AGON1.10 LC-MS/MS with the addition of enzymatic digestion and sample clean-up steps. In summary, organ or muscle tissues are hydrolyzed with two enzymes to release bound ractopamine prior to QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) extraction and dSPE cleanup. Analysis by LC-MS/MS measures ractopamine levels in tissues down to the USDA export action level of 0.1 ppb. The advantage of LC-MS/MS is mass spectrometry further confirming the chromatographic analysis of ractopamine by measuring exact mass and three identifiable fragments.

Reportable Limit of Quantitation*:	0.1 ppb
Amount of Sample Needed:	100g
Standard Turnaround Time:	10 days

*FSNS is capable of quantifying to 0.02 ppb, but will report to the USDA export action level of <0.1 ppb unless otherwise requested.