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Quantitative Assays With Microtracers F

(The Counting of Demagnetized Particles)

Introduction:

Microtracers (tm) F (colored uniformly sized iron particles) are easily retrievable "harmless markers" used to code the presence of vitamins, minerals and drugs in animal and poultry feeds. They are also used to measure the quality of mix of feeds and to locate and quantify "feed carryover" in feed manufacturing equipment. They are described in detail in Micro-Tracers' literature items “A-4 Microtracers F – The Use of Microtracers to Determine Completeness of Mix” and “A-5 Microtracers F – Testing for ‘Cross Contamination’ in Medicated Feeds”.

While many times, clients need only qualitative information from Microtracer analyses, sometimes they need quantitative information, as when determining quality of mixing. This literature item describes our current method for obtaining quantitative results from Microtracer F analyses.

The Method:

Materials

1. Microtracer ™ "Rotary Detector"
2. " Demagnetizer (bulk tape eraser) (available from Radio Shack or from Micro-Tracers,Inc)
3. An electric hot plate or an oven
4. A coffeemill *(burrmill* type preferred) to grind pellets to a mash.
5. A 30 ml analytical scoop
6. An aluminum cookie sheet (one can make this from heavy aluminum foil)
7. A small fan tail brush or equivalent
8. Whatman #1 filter paper, **7** cm circles with 1/8" holes punched in center and either 15 or 24 cm Whatman #1 circles
9. Paper towels
10. A 500 ml beaker (a coffee cup will do) and an eyedropper
11. Water and ethanol (vodka will do) and for certain feeds and tracers DMSO (dimethylsulfoxide)

Procedure

1) Pour a weighed sample of feed through the "Rotary Detector" To assure complete tracer recovery, the sample may be passed through the unit twice. Approximately 98% of Microtracers F will be retrieved on the first pass and nearly 100% will be retrieved in two passes.

The weight of the sample to be analyzed is determined in advance to yield a desired number of tracer particles. If one wants to find approximately 100 particles of Microtracer and one formulated the tracer at 50 grams per 2,000-lbs. of feed, one would analyze 75 grams of feed (25,000 particles per gram of tracer multiplied by 50 grams of tracer divided by 2,000 and divided again by 75/455 grams = 103).

Pellets must be ground to mash prior to analysis. Refer to literature item “A-2” for proper operation of the "Rotary Detector"

2) Take the magnetic material isolated from the feed sample by the "Rotary Detector" and transfer it to the 30 ml analytical scoop. Do not develop the tracer on the "Rotary Detector" magnet.

3) "Demagnetize" this material by holding the weigh scoop directly over the bulk tape eraser, turning the bulk tape "on" and slowly raising the scoop to a distance 2 or 3 feet from the eraser. Turn the eraser "off" The magnetic material separated by the "Rotary Detector" will now be "demagnetized" and free flowing.

4) Wet a 15 or 18.5 cm Whatman #1 circle with the applicable tracer developer. For most feeds this will be a 50% ethanol solution. For mash feeds, the paper must be uniformly wetted but not too wet. Certainly, no beads of moisture should be present. For pelleted feeds, the paper should be wetter than for mash feeds but still no beads of moisture should be present.

5) Sprinkle the magnetic material (Including the Microtracers F) from the scoop onto the wetted paper so the material is evenly distributed on the paper. This is the most difficult part of the analysis. Even distribution of the material may be achieved by moving the scoop in a circular pattern over the filter paper, slowly increasing the angle of incline of the spout of the scoop until tracer falls from the scoop to the paper. It is also helpful to tap the scoop. This may assist in"bouncing" the magnetic material from the scoop to the paper.

6) As soon as any color is visually apparent, transfer the wetted filter paper to a hot plate pre-heated to 300 degrees F to fix the spots.

7) When the paper is dry, mark it for identification. Count the colored spots by circling the spots.

8) Employ Poisson statistics and chi-squared calculations to interpret the results of the trial.