

# NutrientSmart™ Test Kit

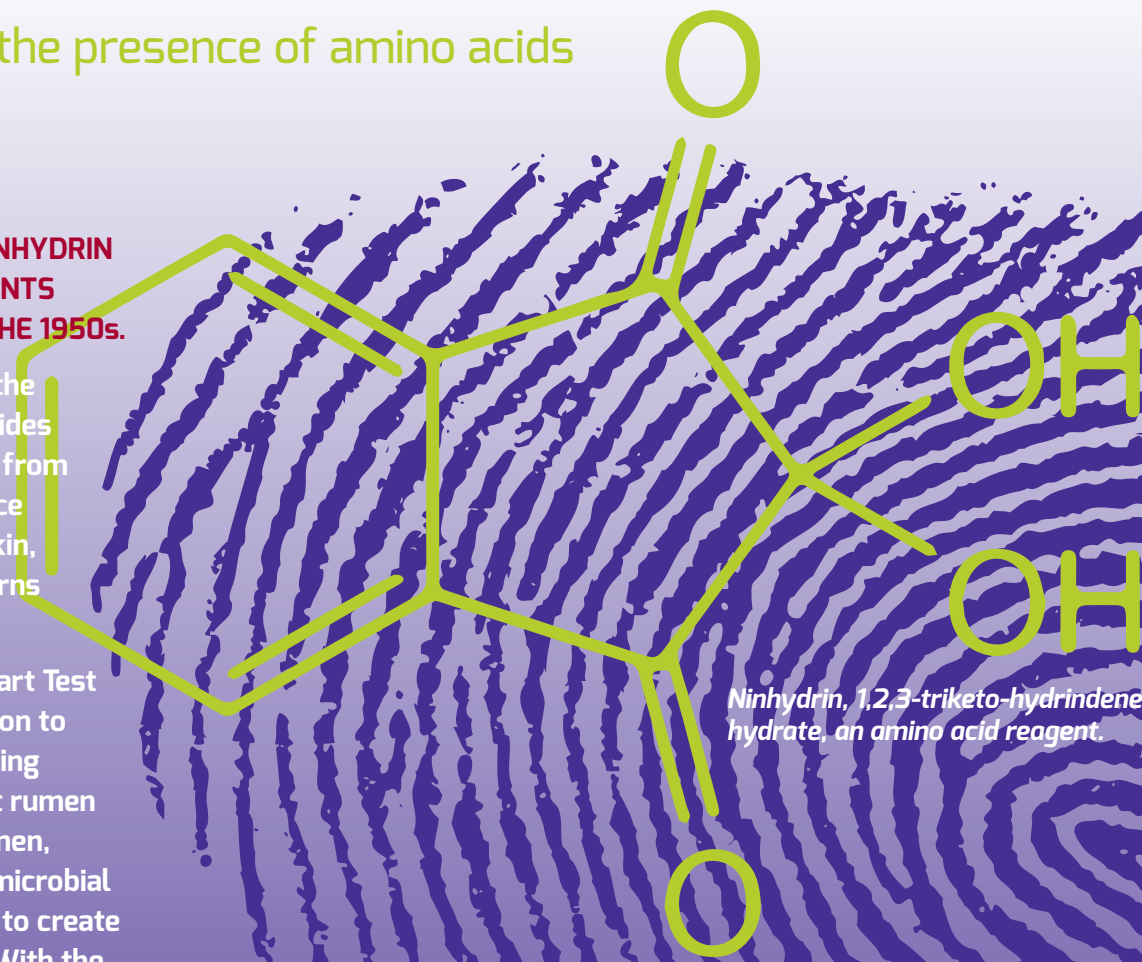
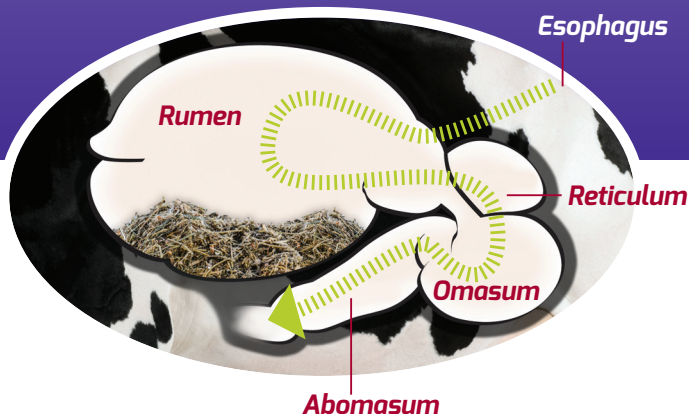
To fingerprint the presence of amino acids

## INTEREST IN USING NINHYDRIN TO REVEAL FINGERPRINTS DEVELOPED DURING THE 1950s.

Ninhydrin reacts with the amine residues in peptides and proteins sloughed from the skin. In the presence of amino acids from skin, a ninhydrin solution turns a deep bluish purple.

Today, the NutrientSmart Test uses a ninhydrin solution to quickly reveal if a coating fails to protect against rumen degradation. In the rumen, temperature, pH, and microbial fermentation combine to create a harsh environment. With the NutrientSmart Test, if a coating fails the ninhydrin solution changes color in minutes to a bluish purple.

*A coating's ability to provide rumen protection is revealed by the NutrientSmart Test.*



Ninhydrin, 1,2,3-triketo-hydrindene hydrate, an amino acid reagent.

## Overview



1. Adisseo developed a simple test to evaluate the stability of a coating in a cow's rumen and, therefore, its ability to protect an amino acid such as methionine.



2. The NutrientSmart Test is conducted at a temperature higher than that of a cow's rumen to accelerate the reaction. When conducted at rumen temperature, the same outcome is achieved, however, reaction times are longer.



3. Coatings with superior rumen protection better withstand the rumen environment. They prevent the destruction of the amino acids in the rumen.



# NutrientSmart™ Test Protocol

**SAFETY FIRST:** Avoid contact with the ninhydrin solution. Work in a well ventilated area. Wear disposable rubber gloves. Residue from fingers and skin cells react with the ninhydrin solution.

## Reading the Results

Amino acids react with ninhydrin. When they do, the ninhydrin solution becomes a shade of bluish purple. Ninhydrin solutions containing higher amino acid concentrations develop deeper colors. The lighter the color resulting from the NutrientSmart Test, the greater the rumen protection the coating provides.

1. Insert a 1-gram sample (1/4 teaspoon) of Smartamine® M into a test tube.
2. Create a positive control by placing a dusting of unprotected dl-methionine in a test tube.
3. Insert a 1-gram sample (approx. 1/4 teaspoon) of another RP-methionine product into a test tube. Repeat if other competitive products are to be tested.
4. Add 3 ml of water to each test tube: Set test tubes aside.
5. Heat a beaker of water to 170°F (77°C). A microwave can be used.
6. When the water reaches 170°F (77°C), add 8 drops of ninhydrin 1% solution to each test tube. Cap each test tube. While doing so, avoid contact with the ninhydrin solution.
7. Mix by gently inverting the capped test tubes 10 times. After mixing, all beadlets should be at the bottom of the test tubes.
8. Remove the beaker from the heat source and insert the test tubes into the hot water bath. Start timer.
9. Within 2-3 minutes, the positive control should begin turning purple.
10. After 5 minutes, gently mix test tubes by “flicking” or tapping tubes about 5 times.
11. A very light, translucent purple color in the test sample means about 15% damage. Darker colors indicate a greater level of damage. The negative control tube should have no color formation.

*Note: Reaction is time-sensitive. It is critical to follow temperature and time instructions.*

