ENSURING COATING CONSISTENCY:

CHALLENGES AND APPROACHES

RESEARCH AND DEVELOPMENT, AFB INTERNATIONAL

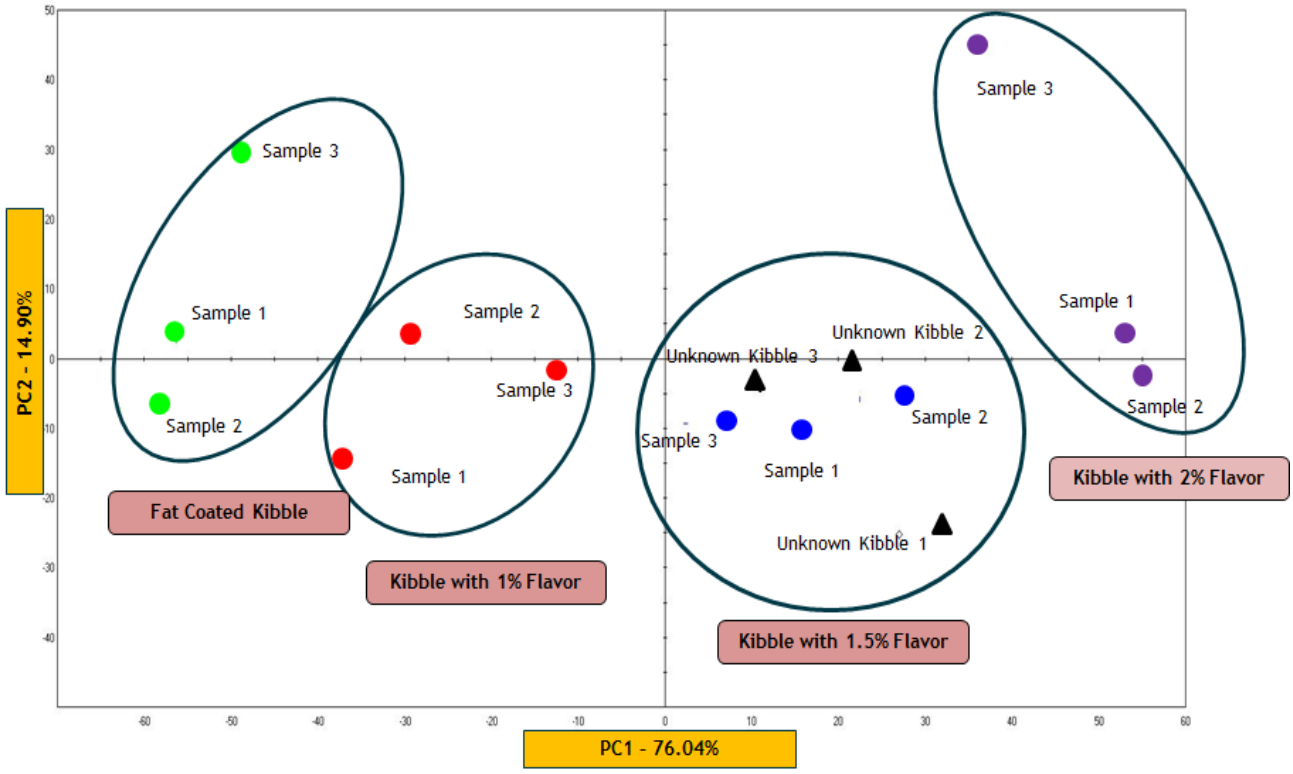
Several factors such as fat level, application rate, and coating systems affect uniform coating of palatants.

This study focused on evaluating the coating consistency of palatants applied to kibble. Coating consistency is defined as the uniform application of the palatant on the kibble, leading to better product performance.

Electronic tongue, surface pH, sodium meter, Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) were the methods used to determine the coating levels of the palatants. Using a combination of methods helped determine the expected versus actual adherence of the palatant.

Kibbles were coated with 3% fat and various levels of dry cat palatant (1%, 1.5%, and 2%) to establish the calibration curve. All samples were analyzed using electronic tongue, surface pH meter, sodium meter, and ICP-MS to estimate the percent coating of the dry cat palatant on the kibble.

Figure 1: Electronic tongue



The electronic tongue classified the kibbles into groups based on the application levels of the palatants (Figure 1). The Principle Component Analysis (PCA) showed a 76.04% (PC1) classification between the kibbles, and the unknown kibble was predicted to belong to kibble cluster with 1.5% flavor.

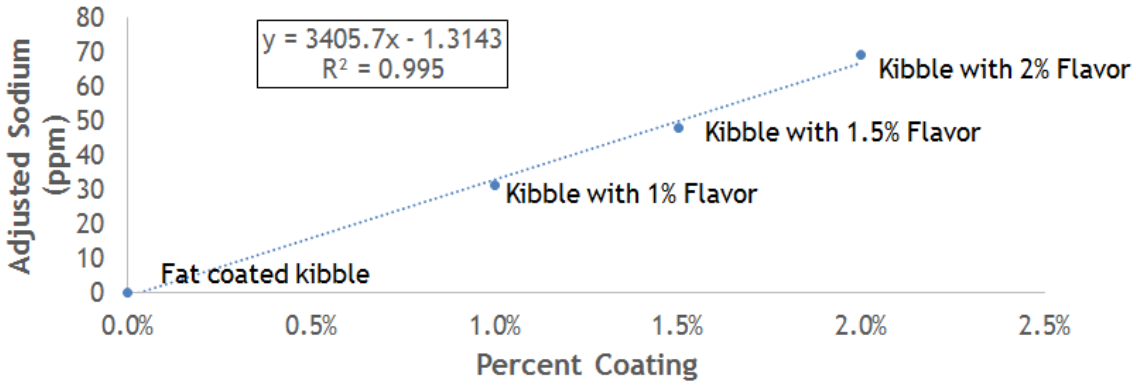
Table 1. Surface pH and sodium meter

The surface pH of the kibbles is a function of the marker compound present inside the dry cat palatant. Kibbles coated with different levels of palatant showed a gradual decrease in surface pH with increase in application rate of the palatant. The amount of free sodium associated with the marker compound increases with the increase in percent coating of the kibble.

Kibbles	Surface pH	Sodium (ppm)
Fat Coated Kibble	5.26	348
Kibble with 1% Flavor	4.45	558
Kibble with 1.5% Flavor	4.41	618
Kibble with 2.0% Flavor	4.35	853

Surface pH is an average of 10 replications. Amount of sodium is an average of three replications.

Figure 2: ICP-MS



The calibration curve provided an R^2 of 0.995 at various levels of dry cat palatants coated on the kibble. This calibration curve was used to determine the actual amount of palatant adherence in an unknown sample.

Table 2. Comparison of expected vs. actual percent coating

Table 2 shows the difference between the expected and the actual level of dry cat palatant. The actual percent coated was lower for a 1.5% application rate of the palatant. The fat coated kibble had higher actual percent coating than expected due to the inherent amount of sodium present inside the kibble.

Kibbles	Expected % Coating	Actual % Coating
Fat Coated Kibble	0.00%	0.80%
Kibble with 1% Flavor	1.00%	0.91%
Kibble with 1.5% Flavor	1.50%	1.45%
Kibble with 2.0% Flavor	2.00%	2.12%

SUMMARY

Electronic tongue is an excellent qualitative tool to provide insight into coating consistency. The unknown kibble was predicted correctly to belong to 1.5% adherence rate cluster. This method cannot provide the exact percent coated or adhered.

Surface pH - good indicator of similarity or difference between different percent coating, but not in predicting the exact percent coated or adhered.

Sodium meter provides the quantitative amount of sodium associated with the marker compound, but is subject to variability with a standard deviation of ±50 and has limitations with the detection range.

ICP-MS is an excellent quantitative tool to estimate the exact amount of sodium associated with the marker compound, and is able to estimate the exact percent coated or adhered on the kibble derived from the calibration curve.

To learn more about **palatant coating consistency**, contact Punyatoya Mohapatra at pmohapatra@afbinternational.com or visit AFB online at **afbinternational.com**.