EQUIVALENCE TESTING

INSIGHTS FROM THE EXPERTS

BY: JAY HARRISON, AFB INTERNATIONAL

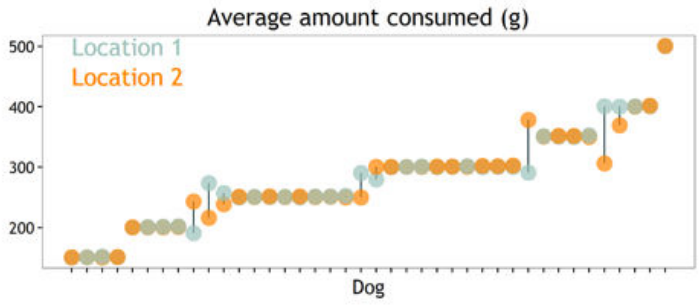
One step in our development of a new palatant is to conduct a feeding trial against a control ration. This experiment is performed to test a null hypothesis that two rations are identical in preference versus an alternative hypothesis indicating that the rations are different in preference. Animals receive both rations, and data are collected on consumption amounts. If the data strongly indicate that the null hypothesis is unreasonable, then that hypothesis is rejected and we declare that the rations are significantly different. However, if the data obtained from the two rations are similar, we do not accept the null hypothesis and decide that the rations are identical. Instead, we conclude that we did not collect enough evidence to assert that they are different. This is similar to a legal trial. In a legal trial, the null hypothesis is that the defendant is innocent and this is evaluated against the alternative hypothesis of the defendant being guilty. Failure to convict the defendant because of weak evidence does not necessarily imply innocence, but rather the need for stronger data in support of guilt.

In some cases, we want to demonstrate parity between rations. As described previously, the lack of a significant difference between rations does not imply that they are identical in preference, so a different type of statistical test is needed. For a test of equivalence in a feeding trial, the alternative hypothesis is that the difference between rations falls within a small, tolerable range, while the null hypothesis states that the two rations differ by a larger amount that is not acceptable to the researcher. If the researcher is confident that the difference between rations is inconsequential, then the null hypothesis is rejected, and the rations can be declared equivalent.

When testing for improvement against the control, the best interpretation of preference comes from a two-bowl test in which the animals are offered both rations simultaneously. However, these tests could lead to erroneous conclusions in equivalence testing. Suppose that two rations are indeed equivalent. In a two-bowl test, a dog could realize the similarity and choose to eat from only one bowl to minimize effort. The data for that dog would imply a strong preference for one ration, which could be misleading. Instead, for testing equivalence, we use monadic feeding, offering the dogs only one bowl with one ration per day. Nonequivalence is indicated by a consistent reluctance to eat all of the food offered from one ration. This requires the dogs to be well fed, so they are not compelled to eat from hunger. They also must be behaviorally conditioned to realize that another meal, perhaps with better palatability, will be offered in the near future.

In a recent trial we conducted, we compared dog rations with palatants produced at two locations to evaluate product consistency. An equivalence test was conducted with 40 dogs to evaluate parity of the rations. The graph below illustrates that, while a few dogs showed a preference for one of the rations, most ate practically the same amounts from both rations. Since we were confident that neither ration was preferred over the other by more than 5%, the two rations were declared to be equivalent in preference.

Equivalence testing should be used in other situations in which the desired outcome is parity, rather than improvement. Misleading conclusions can be avoided by asking the right questions and conducting appropriate experiments and analyses.



Two dots are shown to indicate each dog's intake of products from Location 1 (blue) and Location 2 (orange). Overlap of points indicates similar amounts of kibble consumed.

For more information contact **Jay Harrison** at jharrison@afbinternational.com or visit AFB online at **afbinternational.com** or **palatantsplus.com.**