

## Supporting Information

### **Innovative multispectral sensor for rapid wine adulteration detection using wavelength selection algorithms**

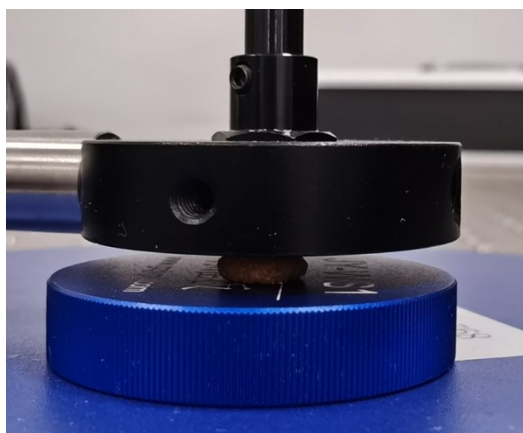
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**Figure S1** Pet food spectrum acquisition process with the customized reflective sample holder.

**Table S1** Basic information and guaranteed nutritional composition of the four brands of pet food samples.

Sample	Brand	E-commerce	Guaranteed Nutritional Composition						
			Protein	Fat	Fiber	Ash	Moisture	Ca	Taurine
A	MeiYangYang	Taobao	≥30%	≥13%	≤5%	≤10%	≤10%	≥1.2%	≥0.15%
B	NuoBiLi	Taobao	≥42%	≥18%	≤5%	≤10%	≤10%	≥0.1%	≥0.2%
C	Unbranded	Taobao	-	-	-	-	-	-	-
D	AiSaKe	Taobao	≥28%	≥10%	≤9%	≤10%	≤10%	≥1.25%	≥0.1%

- Sample C is an unbranded low-end pet food product without fixed packaging and official guaranteed nutritional composition labeling, so the relevant data is not available.

**Table S2** Parameter optimization range and final optimized key settings of the RF model.

Parameter Name	Grid Search Optimization Range	Final Optimized Setting
n_estimators	10, 20, 50, 70, 100, 120, 170, 200, 300, 500, 800	800
criterion	"gini", "entropy"	entropy
max_depth	5, 8, 15, 25, 30	8
random_state	1	1

- The RF model was built based on the scikit-learn library in Python, and hyperparameter optimization was performed via 5-fold cross-validation combined with grid search.

**Table S3** Performance comparison of different mainstream classification models under full-spectrum.

Model	Train	Test
KNN	84.15%	89.77%
SVM	70.94%	72.73%
RF	100.00%	92.05%