

Supplementary Information

After spectral preprocessing, the interval partial least squares (iPLS) and the synergy interval partial least square (SiPLS) algorithms were used to perform the variables selection for extracting useful information and improving the model performance. The optimal wavebands were assigned according to the lowest value of the root mean squared error cross validation (RMSECV). The results are shown in

Table S1.

Table S1 variables selection results for NIR spectrum

Intervals numbers	RMSECV		
	SiPLS		iPLS
	Combination=3	Combination=2	
5	0.1258	0.1249	0.1244
6	0.1233	0.1201	0.1206
7	0.1244	0.1219	0.1205
8	0.1252	0.1242	0.1227
9	0.1235	0.1230	0.1221
10	0.1234	0.1218	0.1222
11	0.1220	0.1226	0.1222
12	0.1031	0.0929	0.1238
13	0.1191	0.1187	0.1290
14	0.1033	0.1204	0.1279
15	0.1218	0.1225	0.1264
16	0.1194	0.1227	0.1270
17	0.1775	0.1163	0.1170
18	0.1169	0.1200	0.1179
19	0.1183	0.1215	0.1256
20	0.1188	0.1222	0.1249
21	0.1048	0.1222	0.1254
22	0.1142	0.1222	0.1264
23	0.1084	0.1230	0.1272
24	0.1195	0.1185	0.1280
25	0.1137	0.1209	0.1276
26	0.1066	0.1207	0.1278
27	0.1152	0.1202	0.1274
28	0.1069	0.1172	0.1280
29	0.1068	0.1256	0.1284
30	0.1214	0.1257	0.1269

31	0.1201	0.1249	0.1278
32	0.0931	0.1188	0.1179
33	0.0965	0.1184	0.1199
34	0.1159	0.1170	0.1207
35	0.0827	0.1189	0.1265
36	0.0999	0.1173	0.1212
37	0.1026	0.1176	0.1266
38	0.1183	0.1228	0.1278
39	0.1092	0.1228	0.1271
40	0.1062	0.1237	0.1250

The results after different variables selection methods are shown in **Table S2**.

They indicated that the PLS model without any variables selection showed the best calibration and validation performance.

Table S2 Results for different variables selection methods after 1std+S-G preprocessing

Method	LVs	r_{cal}	RMSEC	RMSECV	BIAS _{cal}	r_{val}	RMSEP	RPD	BIAS _{val}
PLS	5	0.9959	0.066	0.160	0.053	0.9492	0.137	3.10	0.101
SiPLS	4	0.9865	0.120	0.155	0.091	0.9239	0.173	2.46	0.149
iPLS	5	0.9906	0.100	0.119	0.076	0.9403	0.147	2.89	0.109