**Supplemental Table 1.** Indicators of all developed models for buffalo raw milk.

	Pre-		Indicators						
Algorithm	processed of MIR <sup>1</sup>	Dataset	Accuracy	Sensitivity	Specificity	AUC <sup>2</sup>	F1 score	MCC	
Partial least	Omi aim al	Calibration	0.95	0.94	0.96	0.96	0.81	0.79	
	Original	Validation	0.77	0.30	0.91	0.85	0.38	0.26	
	Diff	Calibration	0.90	0.89	0.90	0.97	0.48	0.51	
	DIII	Validation	0.80	0.33	0.91	0.86	0.40	0.29	
squares discriminant	SNV	Calibration	0.87	0.75	0.88	0.95	0.21	0.37	
analysis		Validation	0.84	0.43	0.92	0.85	0.46	0.27	
(PCs: 11) <sup>3</sup>	MSC	Calibration	0.88	0.80	0.88	0.95	0.28	0.33	
(PCS: 11)	MSC	Validation	0.82	0.38	0.92	0.85	0.43	0.29	
	SG(13,4)	Calibration	0.95	0.94	0.96	0.96	0.81	0.79	
	30(13,4)	Validation	0.80	0.33	0.91	0.85	0.40	0.29	
	Omi orimal	Calibration	1.00	1.00	1.00	1.00	1.00	1.00	
	Original	Validation	0.86	0.87	0.83	0.94	0.92	0.57	
	Diff	Calibration	1.00	1.00	1.00	1.00	1.00	1.00	
Support vector machine <sup>4</sup>	DIII	Validation	0.89	0.87	1.00	0.91	0.93	0.69	
	SNV	Calibration	1.00	1.00	1.00	1.00	1.00	1.00	
		Validation	0.86	0.87	0.83	0.89	0.92	0.57	
	MSC	Calibration	0.97	0.99	0.83	0.98	0.98	0.85	
		Validation	0.86	0.84	1.00	0.94	0.91	0.65	
	SG(25,3)	Calibration	1.00	1.00	1.00	1.00	1.00	1.00	
		Validation	0.95	0.95	1.00	0.97	0.97	0.84	
Random forest	Oni sin al	Calibration	1.00	1.00	1.00	1.00	1.00	1.00	
	Original	Validation	0.82	0.84	0.67	0.82	0.89	0.79 0.26 0.51 0.29 0.37 0.27 0.33 0.29 0.79 0.29 1.00 0.57 1.00 0.69 1.00 0.57 0.85 0.65 1.00 0.84 1.00 0.42 1.00 0.42 1.00 0.19 1.00	
	D.cc	Calibration	1.00	1.00	1.00	1.00	1.00	1.00	
	Diff	Validation	0.82	0.84	0.67	0.86	0.89	0.79 0.26 0.51 0.29 0.37 0.27 0.33 0.29 0.79 0.29 1.00 0.57 1.00 0.69 1.00 0.57 0.85 0.65 1.00 0.84 1.00 0.42 1.00 0.42 1.00 0.42 1.00 0.19 1.00 0.16 1.00	
	SNV	Calibration	1.00	1.00	1.00	1.00	1.00	1.00	
		Validation	0.80	0.87	0.33	0.80	0.88	0.19	
	MCC	Calibration	1.00	1.00	1.00	1.00	1.00	1.00	
	MSC	Validation	0.77	0.84	0.33	0.79	0.86	0.16	
	SG(25,3)	Calibration	1.00	1.00	1.00	1.00	1.00	1.00	
		Validation	0.82	0.84	0.67	0.86	0.89	0.42	

<sup>1:</sup> MIR: mid-infrared spectra; Diff: first-order difference; SNV: standardized normal variation; MSC: multiplicative scatter correction; SG: Savitzky-Golag (window length, poly order)

<sup>&</sup>lt;sup>2</sup>: AUC: area under curve

<sup>3:</sup> PCs: number of principal components used by partial least squares discriminant analysis 4: Bold indicates the optimal model for this type of milk

Supplemental Table 2. Indicators of all developed models for bovine raw milk.

Pre-			Indicators							
Algorithm	processed of MIR <sup>1</sup>	Dataset	Accuracy	Sensitivity	Specificity	AUC <sup>2</sup>	F1 score	MCC		
Partial least	Original	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
	Original	Validation	0.96	0.94	1.00	0.99	0.99	0.90		
	Diff	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
	DIII	Validation	0.92	1.00	0.67	0.98	1.00	0.77		
squares discriminant	SNV	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
analysis		Validation	0.96	0.94	1.00	0.99	1.00	0.90		
$(PCs: 20)^{3,4}$	MSC	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
(1 Cs. 20)	MISC	Validation	0.96	0.94	1.00	0.99	0.99	0.90		
	SG(13,7)	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
	50(15,7)	Validation	0.92	0.94	0.83	0.98	1.00	0.78		
	Original	Calibration	0.99	0.99	1.00	1.00	0.99	0.97		
	Original	Validation	0.96	1.00	0.83	1.00	0.97	0.89		
	Diff	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
Support	DIII	Validation	1.00	1.00	1.00	1.00	1.00	1.00		
vector machine	SNV	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
		Validation	0.79	0.89	0.50	0.84	0.86	0.41		
	MSC	Calibration	0.98	0.99	0.96	1.00	0.99	0.94		
		Validation	0.83	0.89	0.67	0.90	0.89	0.56		
	SG(17,2)	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
		Validation	0.88	1.00	0.50	0.84	0.92	0.65		
	Original	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
Random forest	Originar	Validation	0.79	0.94	0.33	0.69	0.87	0.36		
	Diff	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
	Dill	Validation	0.83	1.00	0.33	0.80	0.90	0.52		
	SNV	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
		Validation	0.71	0.94	0.00	0.28	0.83	-0.12		
	MSC	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
	MISC	Validation	0.58	0.78	0.00	0.31	0.74	-0.26		
	SG(17,2)	Calibration	1.00	1.00	1.00	1.00	1.00	1.00		
		Validation	0.79	0.94	0.33	0.82	0.87	0.36		

<sup>1:</sup> MIR: mid-infrared spectra; Diff: first-order difference; SNV: standardized normal variation; MSC: multiplicative scatter correction; SG: Savitzky-Golag (window length, poly order)

<sup>&</sup>lt;sup>2</sup>: AUC: area under curve
<sup>3</sup>: PCs: number of principal components used by partial least squares discriminant analysis

<sup>4:</sup> Bold indicates the optimal model for this type of milk

**Supplemental Table 3.** Indicators of all developed models for bovine pasteurized milk.

	Pre-			Indic	Indicators			
Algorithm	processed of MIR <sup>1</sup>	PCs <sup>2</sup>	Dataset	Accuracy	F1 score	kappa		
	0.01.01.01	16	Calibration	0.68	0.68	0.52		
	Original		Validation	0.67	0.66	0.51		
	Diff	13	Calibration	0.65	0.65	0.48		
			Validation	0.67	0.65	0.51		
Partial least squares	SNV	17	Calibration	0.65	0.65	0.48		
discriminant analysis			Validation	0.64	0.62	0.47		
	MSC	13	Calibration	0.67	0.67	0.51		
			Validation	0.66	0.64	0.49		
	SG(27,2)	9	Calibration	0.68	0.68	0.52		
			Validation	0.63	0.62	0.44		
	Original		Calibration	1.00	1.00	1.00		
			Validation	0.77	0.77	0.65		
	Diff		Calibration	0.93	0.93	0.90		
			Validation	0.75	0.75	0.63		
Support vector	SNV	NA <sup>3</sup>	Calibration	0.58	0.58	0.37		
machine			Validation	0.85	0.85	0.77		
	MSC		Calibration	0.87	0.87	0.80		
			Validation	0.63	0.62	0.44		
	SG(17,3)		Calibration	0.96	0.96	0.93		
			Validation	0.69	0.69	0.53		
			Calibration	1.00	1.00	1.00		
	Original		Validation	0.77	0.77	0.65		
	D:cc		Calibration	1.00	1.00	1.00		
	Diff		Validation	0.86	0.86	0.79		
Random forest <sup>4</sup>	SNV	NA	Calibration	1.00	1.00	1.00		
Nanuom torest		21/ V	INA	Validation	0.44	0.44	0.15	
	MSC		Calibration	1.00	1.00	1.00		
			Validation	0.56	0.56	0.34		
	SG(17,3)		Calibration Validation	1.00 0.89	1.00 0.89	1.00 0.84		

<sup>&</sup>lt;sup>1</sup>: MIR: mid-infrared spectra; Diff: first-order difference; SNV: standardized normal variation; MSC: multiplicative scatter correction; SG: Savitzky-Golag (window length, poly order)

<sup>&</sup>lt;sup>2</sup>: PCs: number of principal components used by partial least squares discriminant analysis

<sup>&</sup>lt;sup>3</sup>: NA: not applicable

<sup>4:</sup> Bold indicates the optimal model for this type of milk

**Supplemental Table 4.** Indicators of all developed models for bovine ultra-high temperature sterilized (UHT) milk.

	Pre-		Indicators				
Algorithm	processed of MIR <sup>1</sup>	$PCs^2$	Dataset	Accuracy	F1 score	kappa	
	Oni ain al		Calibration	0.91	0.91	0.88	
	Original	20	Validation	0.88	0.88	0.83	
	Diff		Calibration	0.90	0.90	0.86	
	DIII	20	Validation	0.87	0.87	0.81	
Partial least squares	SNV		Calibration	0.91	0.91	0.88	
discriminant analysis	214 A	20	Validation	0.90	0.90	0.86	
	MSC	20	Calibration	0.90	0.90	0.87	
			Validation	0.89	0.89	0.84	
	SG(21,2)		Calibration	0.92	0.91	0.88	
	30(21,2)	20	Validation	0.90	0.89	0.86	
	Original		Calibration	0.99	0.99	0.99	
	Original		Validation	0.91	0.91	0.87	
	D:tt		Calibration	0.98	0.99	0.98	
	Diff		Validation	0.92	0.93	0.89	
Support vector	CNIV	$NA^3$	Calibration	1.00	1.00	1.00	
machine	SNV	NA	Validation	0.85	0.86	kappa  1 0.88 0.83 0 0.86 0 0.86 0 0.87 0 0.84 0 0.88 0 0.86 0 0.87 0 0.84 0 0.87 0 0.99 0 0.99 0 0.99 0 0.99 0 0.99 0 0.99 0 0.87 0 0.99 0 0.99 0 0.99 0 0.99 0 0.99 0 0.99 0 0.99 0 0.99 0 0.87 0 0.99 0 0.	
	Mag		Calibration	0.99	0.99	0.88 0.83 0.86 0.81 0.88 0.86 0.87 0.84 0.88 0.86 0.99 0.87 0.98 0.99 1.00 0.79 0.99 0.83 0.98 0.90 1.00 0.84 1.00 0.89 1.00 0.28 1.00 0.34 1.00	
	MSC		Validation	0.88	0.87	0.83	
	GG(24.2)		Calibration	0.98	0.99	0.98	
	SG(21,2)		Validation	0.93	0.94	0.90	
	0.5.5.5.1		Calibration	1.00	1.00	1.00	
Random forest <sup>4</sup>	Original		Validation	0.89	0.89	0.84	
	D:cc		Calibration	1.00	1.00	1.00	
	Diff		Validation	0.92	0.93	0.89	
	CNIV	NA	Calibration	1.00	1.00	1.00	
	Random forest	SNV	NA	Validation	0.48	0.47	0.28
	MSC		Calibration	1.00	1.00	1.00	
	MSC		Validation	0.53	0.49	0.34	
	SG(21-2)		Calibration	1.00	1.00	1.00	
	SG(21,2)		Validation	0.92	0.93	0.89	

<sup>1:</sup> MIR: mid-infrared spectra; Diff: first-order difference; SNV: standardized normal variation; MSC: multiplicative scatter correction; SG: Savitzky-Golag (window length, poly order)

<sup>&</sup>lt;sup>2</sup>: PCs: number of principal components used by partial least squares discriminant analysis

<sup>&</sup>lt;sup>3</sup>: NA: not applicable

<sup>4:</sup> Bold indicates the optimal model for this type of milk