

Supplementary Information

Tables

Table 1. Developed PLSR calibration models using different pre-processing techniques

Attribute	Calibration	Pre-processing Technique					
		SNV	Savitzky-Golay (n = 11)	MSC	1 st order derivative	2 nd order derivative	Savitzky-Golay (n = 11) and SNV
Fat	R_c^2	0.99	0.98	0.99	0.99	0.99	0.99
	RMSEC	2.77	3.00	2.25	2.36	2.51	1.91
	R_{cv}^2	0.97	0.97	0.98	0.98	0.98	0.99
	RMSECV	4.18	4.27	3.75	3.93	3.88	2.48
Moisture	R_c^2	0.98	0.98	0.99	0.99	0.98	0.99
	RMSEC	2.28	2.47	1.84	2.00	2.12	1.73
	R_{cv}^2	0.97	0.97	0.98	0.97	0.97	0.98
	RMSECV	3.43	3.49	2.98	3.34	3.26	2.22
Protein	R_c^2	0.98	0.98	0.99	0.99	0.99	0.99
	RMSEC	0.65	0.69	0.54	0.55	0.59	0.42
	R_{cv}^2	0.97	0.97	0.97	0.97	0.97	0.98
	RMSECV	0.98	1.00	0.99	0.89	0.90	0.68
Ash	R_c^2	0.98	0.98	0.98	0.98	0.98	0.98
	RMSEC	0.03	0.04	0.03	0.03	0.04	0.03
	R_{cv}^2	0.96	0.96	0.95	0.95	0.94	0.96
	RMSECV	0.06	0.06	0.06	0.06	0.07	0.05

* 5 number of pls components were used for all models.

Table 2 Comparison of standard deviation for reference values and the SEP values obtained for pure minced lean beef

Attribute	Standard deviation of proximate values for minced lean beef	Validation			
		SEP			
		Static		Motion	
		without baseline correction	with baseline correction	without baseline correction	with baseline correction
Fat	±0.86	4.19	3.46	3.98	5.82
Moisture	±0.58	3.30	3.03	2.89	4.89
Protein	±0.49	1.41	0.98	1.17	1.07
Ash	±0.06	0.09	0.09	0.11	0.07

*5 pls components were used for calculating SEP values and the predicted values at a stand-off distance of 1.5 cm were chosen.

Table 3 Comparison of standard deviation for reference values and the SEP values obtained for minced beef fat trimmings

Attribute	Standard deviation of proximate values for minced beef fat trimmings	Validation			
		SEP			
		Static		Motion	
		without baseline correction	with baseline correction	without baseline correction	with baseline correction
Fat	±4.74	4.28	8.01	3.51	4.75
Moisture	±4.86	3.69	6.04	3.36	3.44
Protein	±0.26	1.05	2.14	0.69	1.55
Ash	±0.04	0.05	0.10	0.05	0.08

*5 pls components were used for calculating SEP values and the predicted values at a stand-off distance of 1.5 cm were chosen.

Table 4. PLSR results for prediction of chemical components in motion

Attribute	No. of components	Probe-sample distance (cm)	Validation			
			Motion			
			Without baseline correction		With baseline correction	
			R_p^2	SEP	R_p^2	SEP
Fat	5	1	0.74	10.05	0.78	11.17
		1.5	0.85	7.19	0.79	10.46
		4	0.90	8.20	0.87	9.39
Moisture	5	1	0.70	7.76	0.74	9.16
		1.5	0.83	5.80	0.74	8.93
		4	0.90	6.23	0.87	7.14
Protein	5	1	0.87	2.13	0.80	2.80
		1.5	0.88	1.93	0.83	2.49
		4	0.90	1.71	0.89	1.93
Ash	5	1	0.76	0.12	0.67	0.14
		1.5	0.74	0.10	0.70	0.15
		4	0.67	0.16	0.74	0.14

Figures

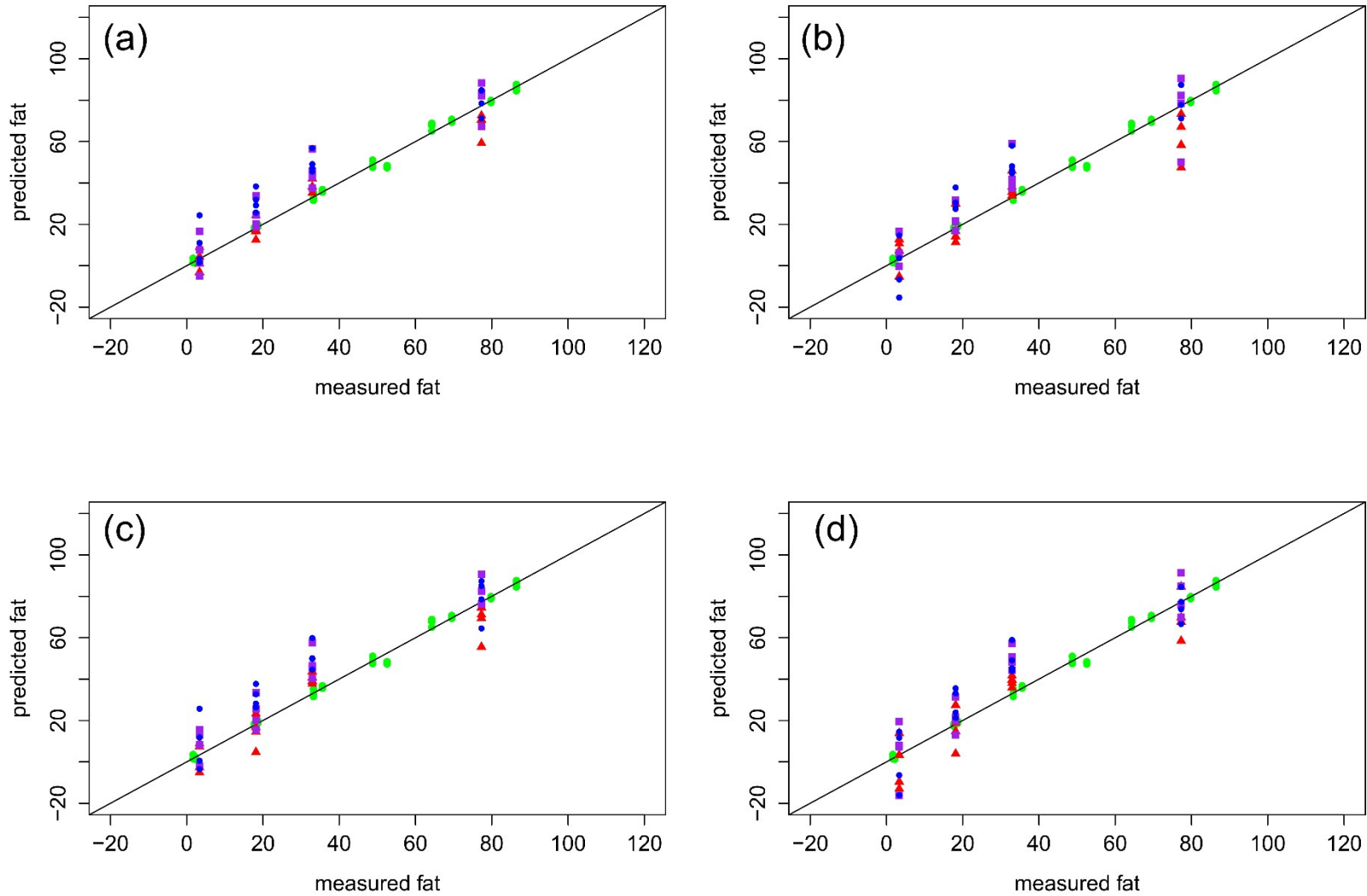


Fig. 1. Prediction plots for fat in static as well as in motion; (a) static- without baseline correction, (b) static- with baseline correction, (c) motion- without baseline correction and (d) motion- with baseline correction (●: Training set, ▲: Testing set (4 cm), ■: Testing set (1.5 cm) and ●: Testing set (1 cm)).

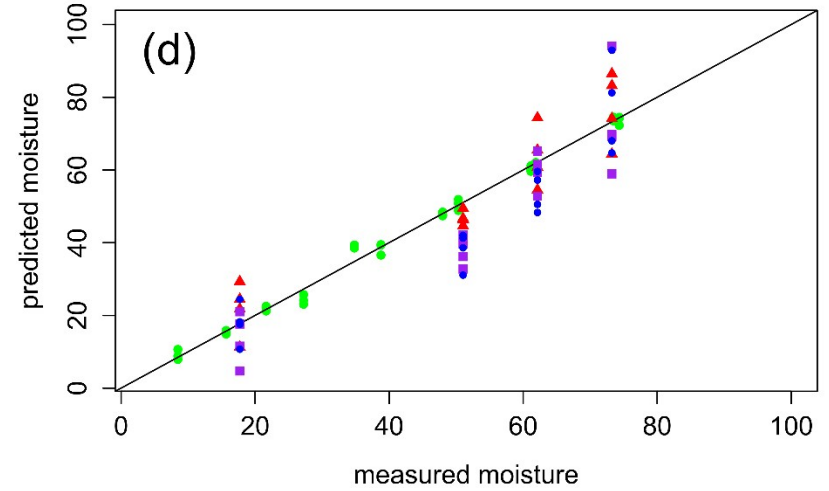
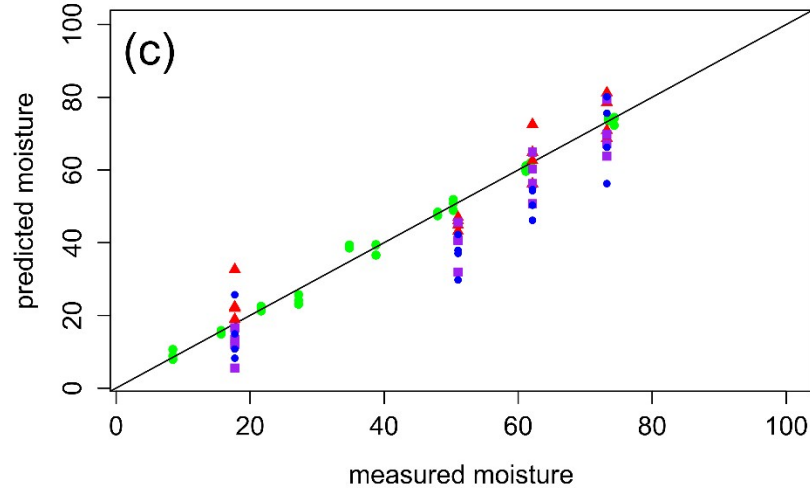
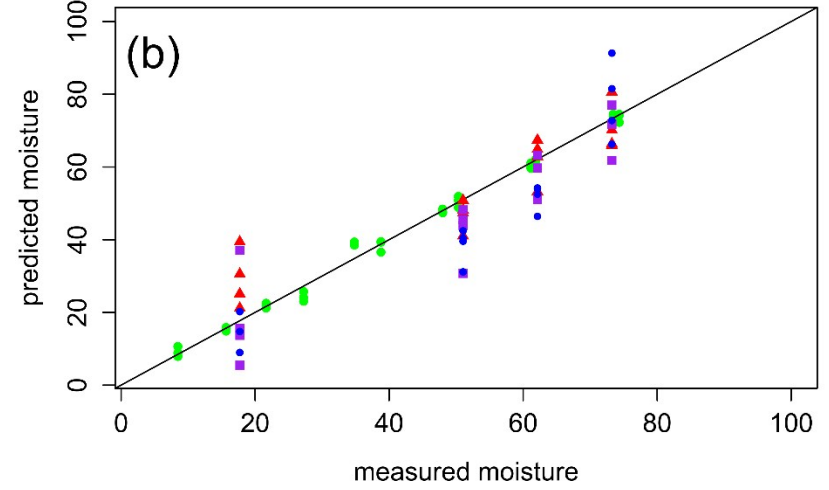
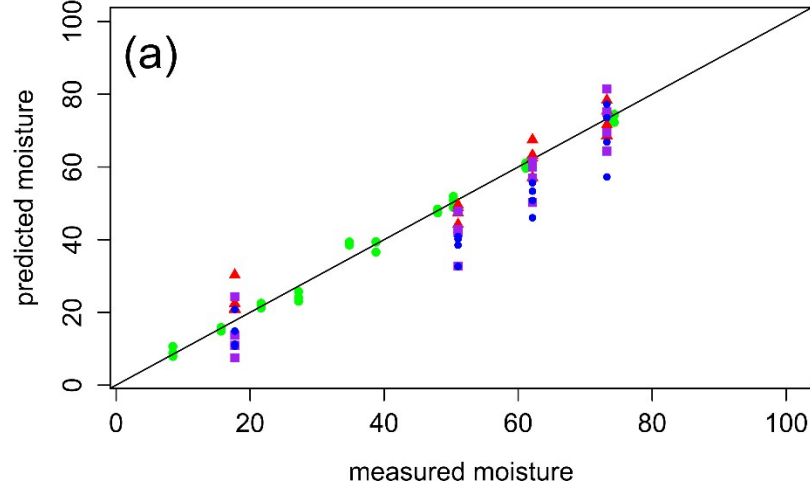


Fig. 2. Prediction plots for moisture in static as well as in motion; (a) static- without baseline correction, (b) static- with baseline correction, (c) motion- without baseline correction and (d) motion- with baseline correction (●: Training set, ▲: Testing set (4 cm), ■: Testing set (1.5 cm) and ●: Testing set (1 cm)).

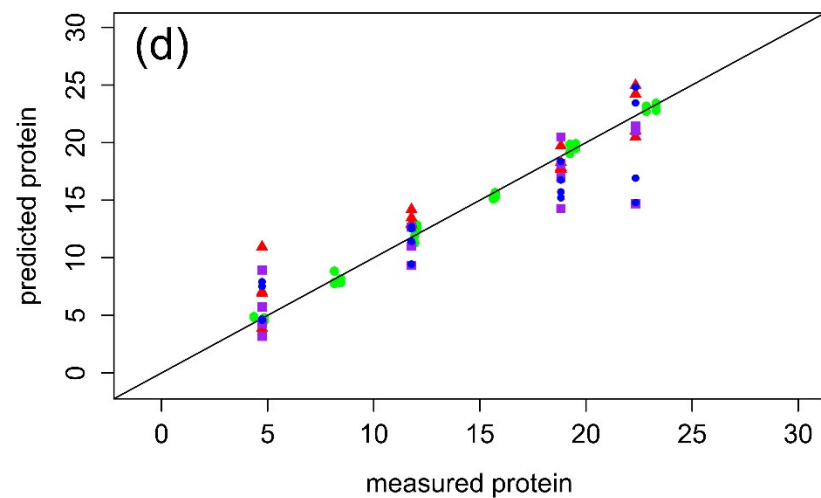
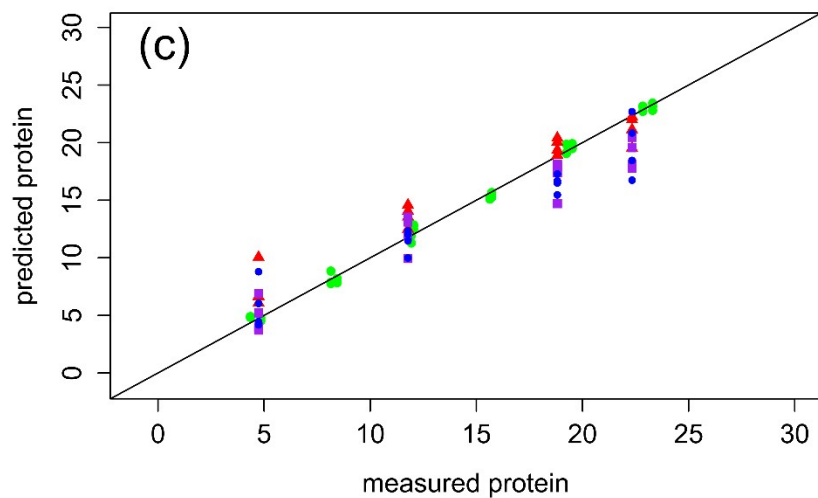
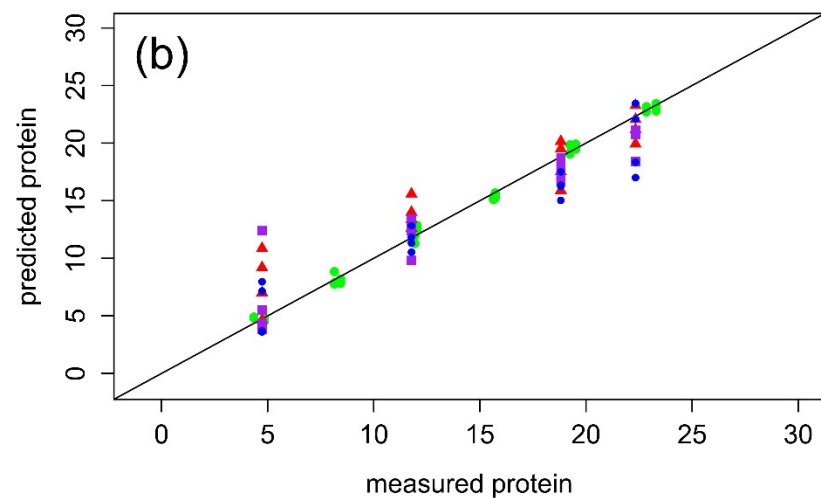
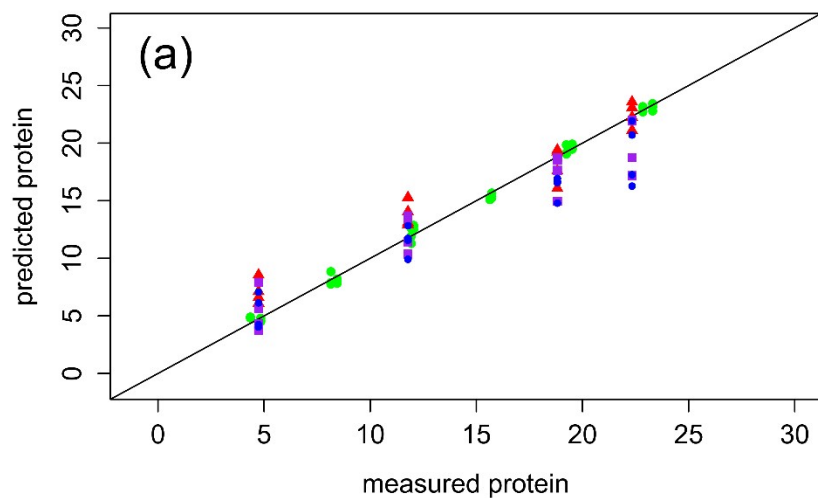


Fig. 3. Prediction plots for protein in static as well as in motion; (a) static- without baseline correction, (b) static- with baseline correction, (c) motion- without baseline correction and (d) motion- with baseline correction (●: Training set, ▲: Testing set (4 cm), ■: Testing set (1.5 cm) and ●: Testing set (1 cm)).

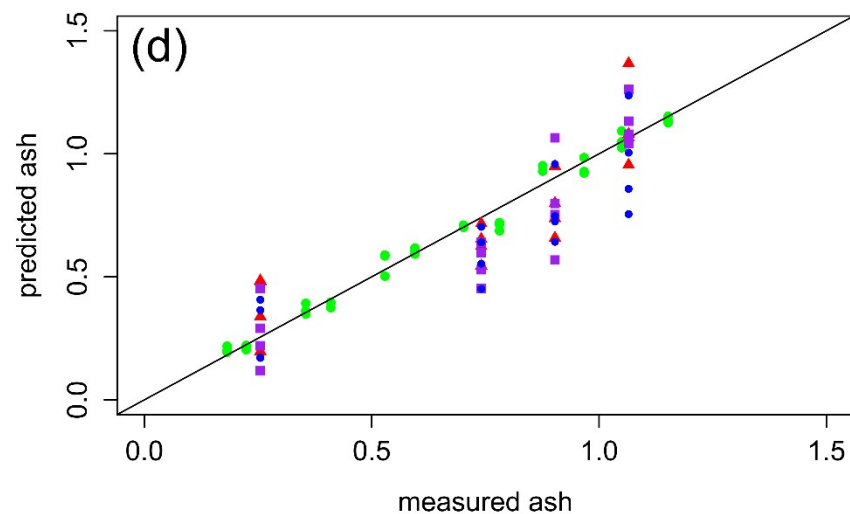
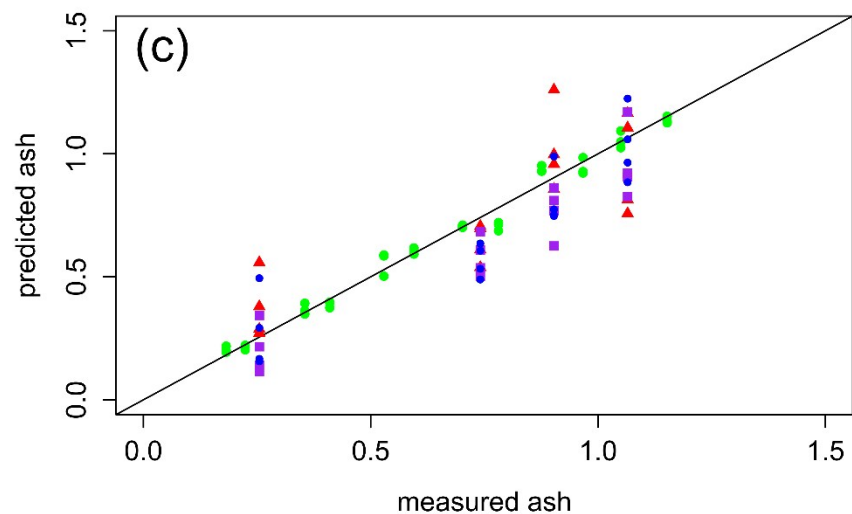
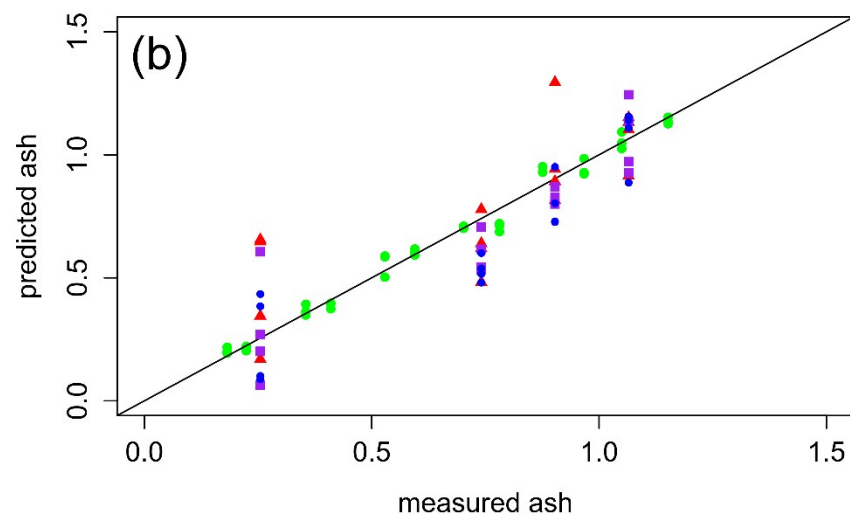
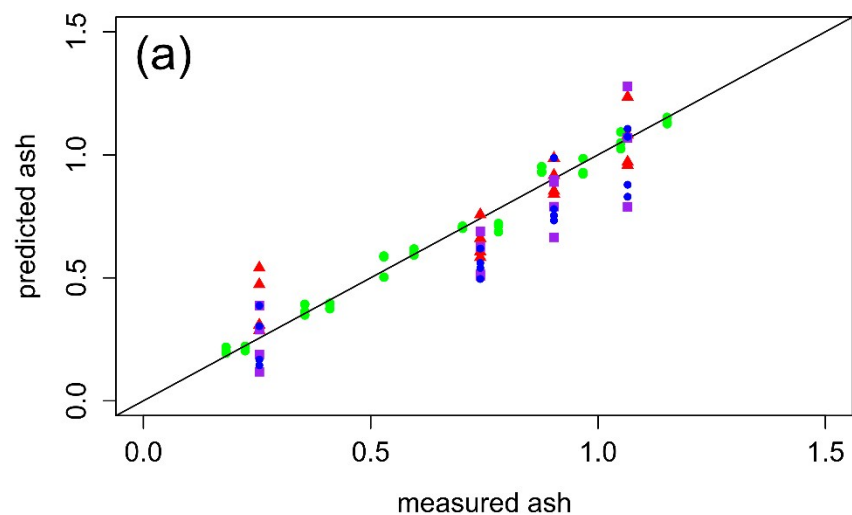


Fig. 4. Prediction plots for ash in static as well as in motion; (a) static- without baseline correction, (b) static- with baseline correction, (c) motion- without baseline correction and (d) motion- with baseline correction (●: Training set, ▲: Testing set (4 cm), ■: Testing set (1.5 cm) and ●: Testing set (1 cm)).

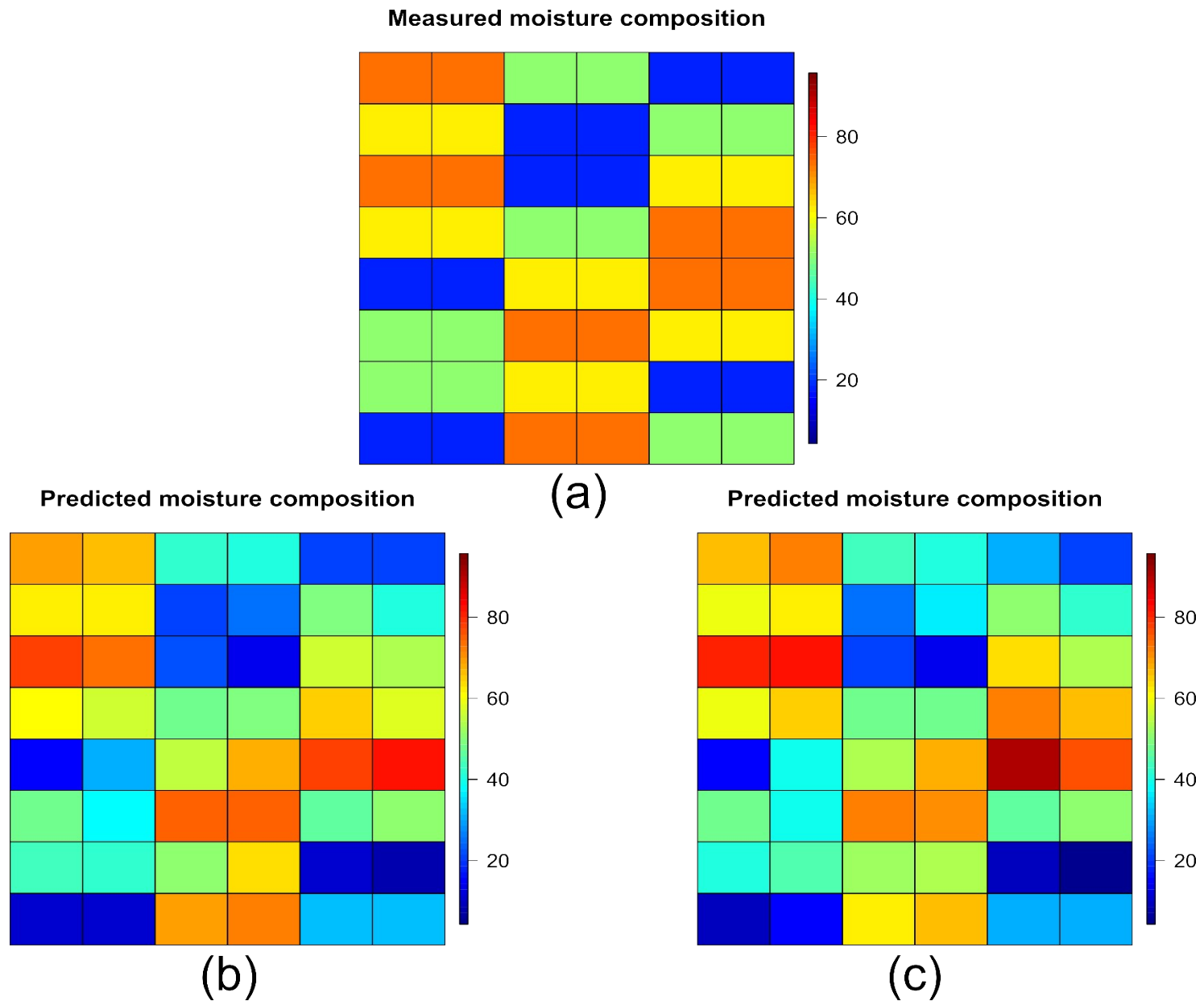


Fig. 5. Spatial map for percentage of moisture content in static conditions distributed as; (a) Measured moisture content, (b) Predicted moisture content without baseline correction adjustment (c) Predicted fat with baseline correction adjustment.

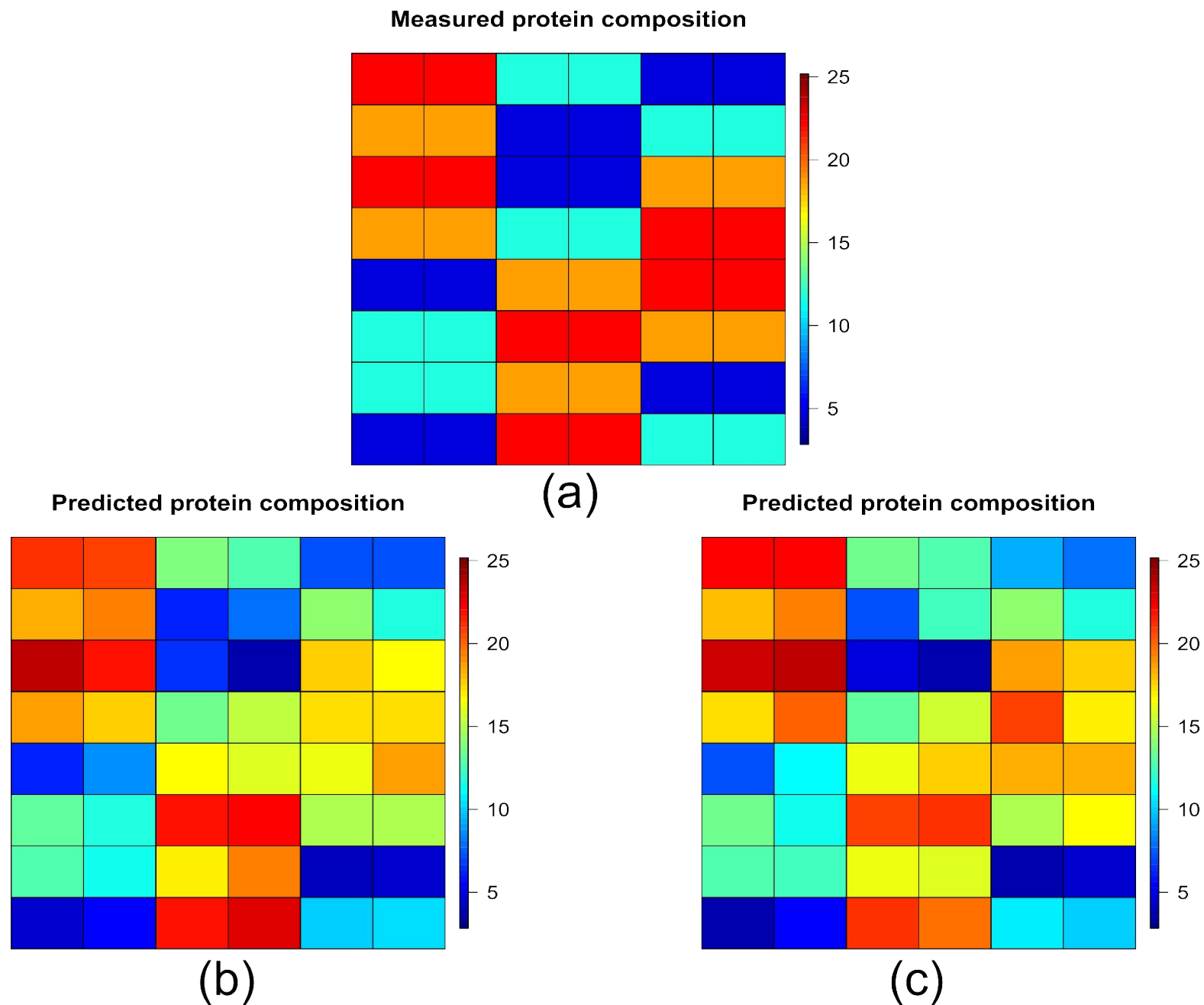


Fig. 6. Spatial map for percentage of protein content in static conditions distributed as; (a) Measured protein content, (b) Predicted protein content without baseline correction adjustment (c) Predicted fat with baseline correction adjustment.

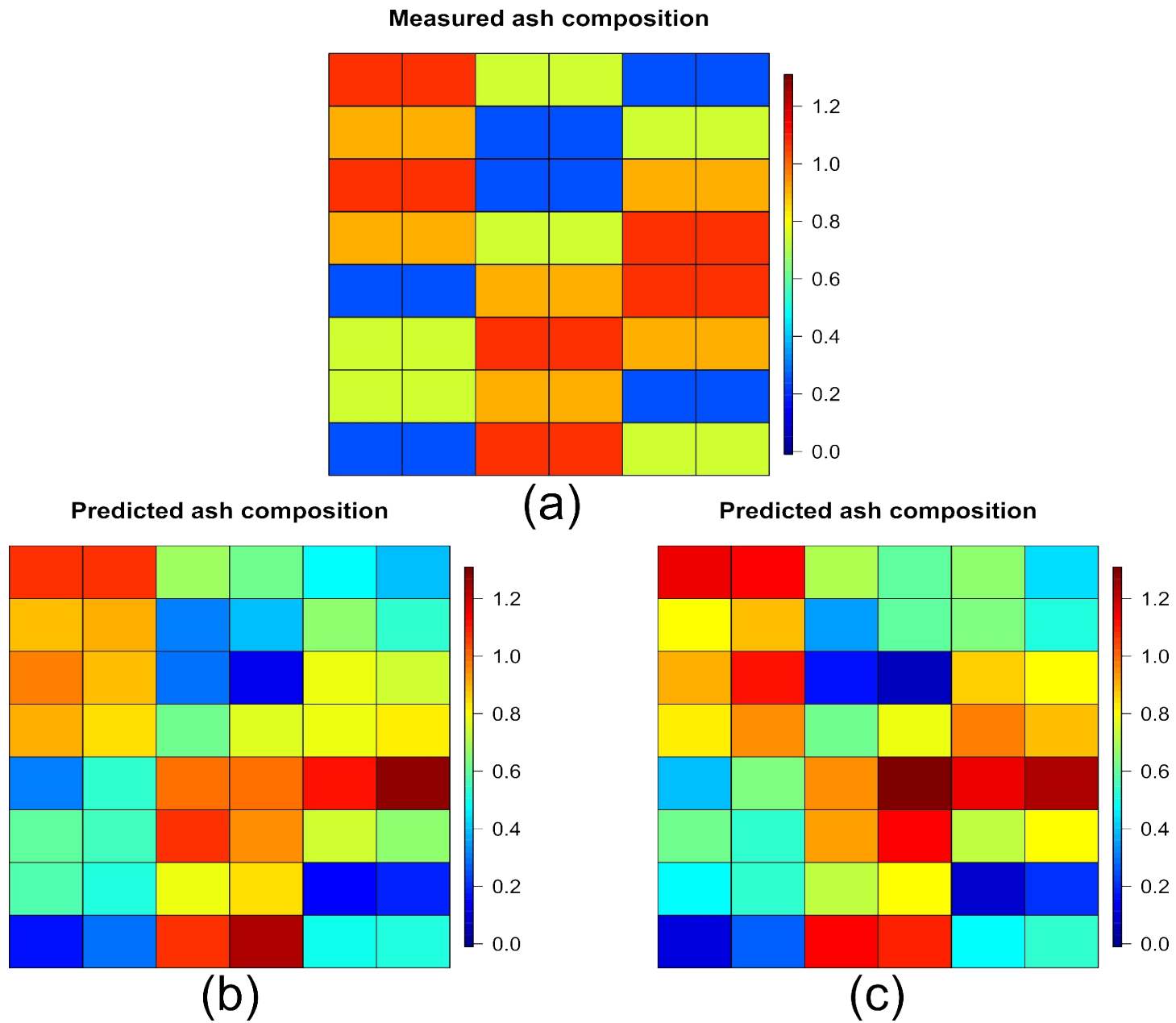


Fig. 7. Spatial map for percentage of ash content in static conditions distributed as; (a) Measured ash content, (b) Predicted ash content without baseline correction adjustment (c) Predicted fat with baseline correction adjustment.