Supplementary materials

Figure S1: Farms location in the Pianura Padano Veneta country. Dati cartografici ©2021 Google,GeoBasis-DE/BKG (©2009)
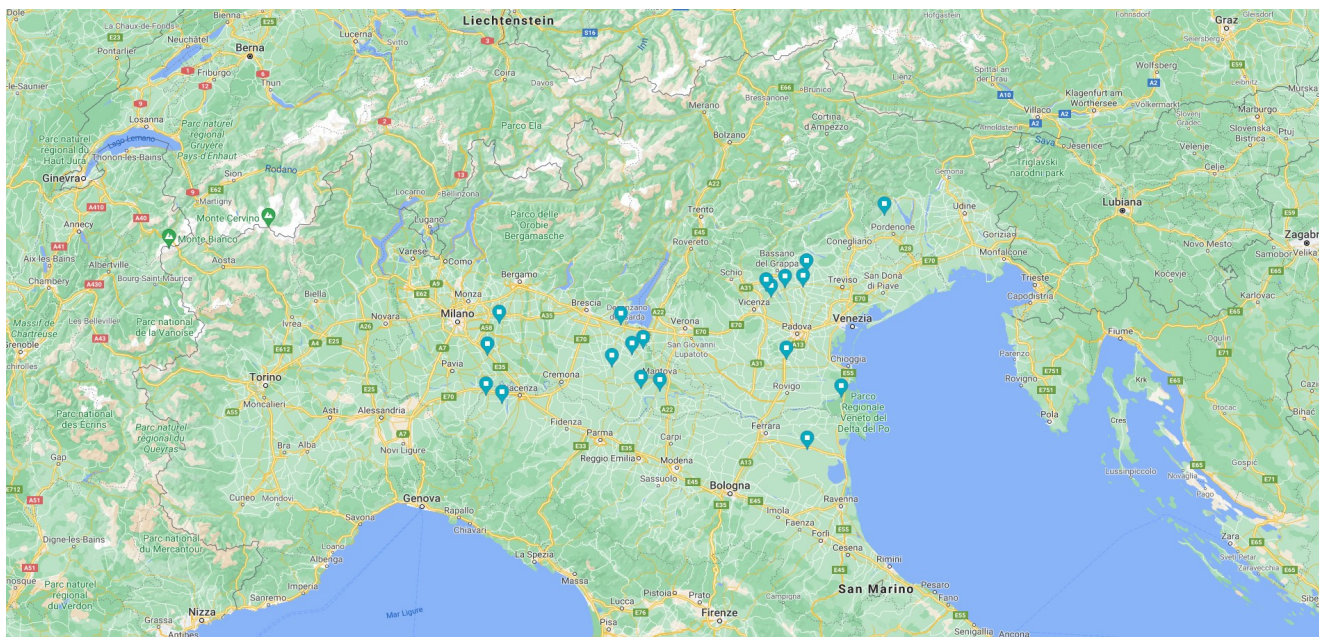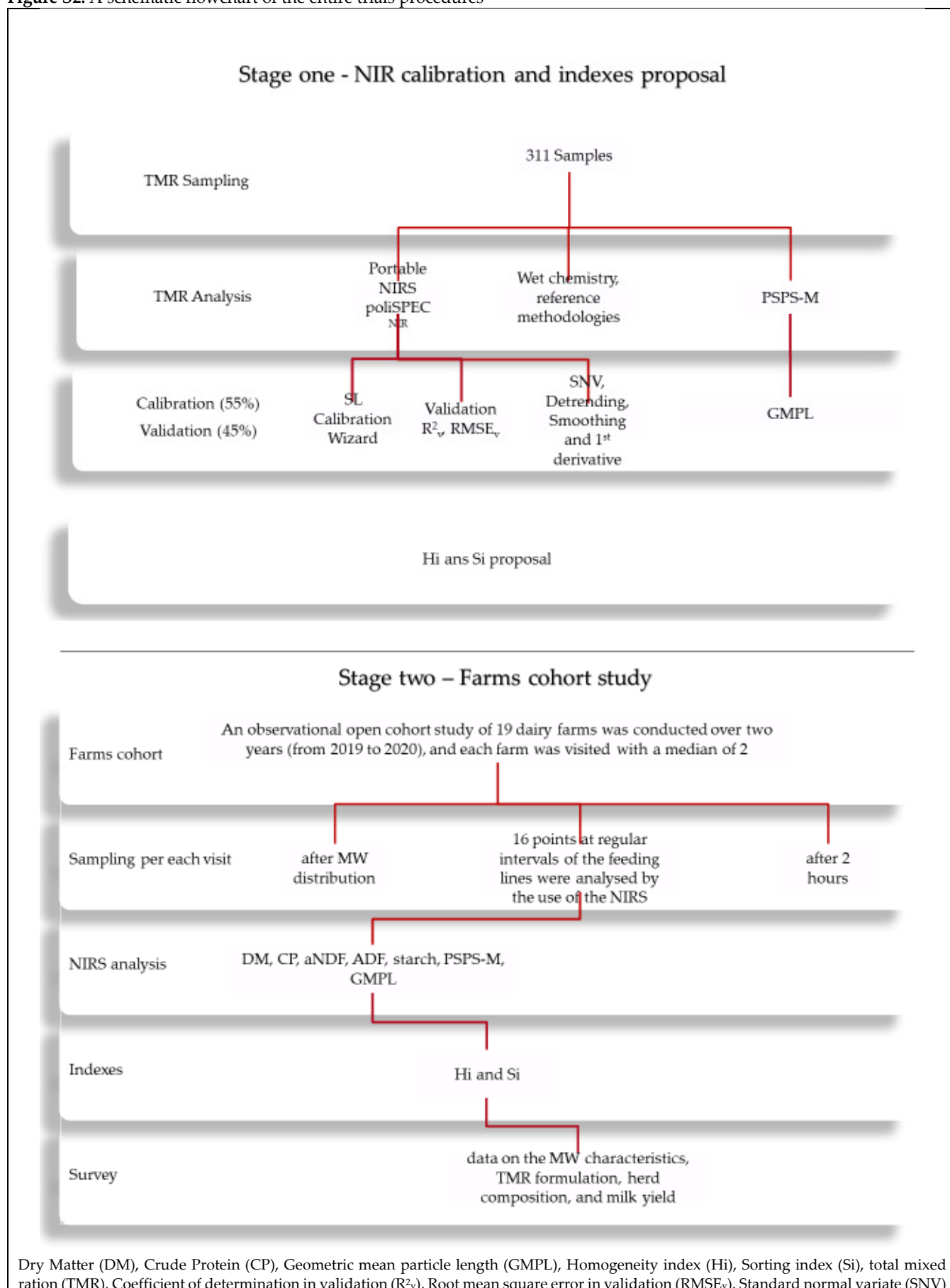
Figure S2: A schematic flowchart of the entire trials procedures   4

Stage one - NIR calibration and indexes proposal

TMR Sampling · 311 Samples

TMR Analysis · Portable NIRS poliSPEC NIR · Wet chemistry, reference methodologies · PSPS-M

Calibration (55%) Validation (45%) · SL Calibration Wizard · Validation R^2_v, $RMSE_v$ · SNV, Detrending, Smoothing and 1st derivative · GMPL

Hi ans Si proposal

Stage two – Farms cohort study

Farms cohort · An observational open cohort study of 19 dairy farms was conducted over two years (from 2019 to 2020), and each farm was visited with a median of 2

Sampling per each visit · after MW distribution · 16 points at regular intervals of the feeding lines were analysed by the use of the NIRS · after 2 hours

NIRS analysis · DM, CP, aNDF, ADF, starch, PSPS-M, GMPL

Indexes · Hi and Si

Survey · data on the MW characteristics, TMR formulation, herd composition, and milk yield

Dry Matter (DM), Crude Protein (CP), Geometric mean particle length (GMPL), Homogeneity index (Hi), Sorting index (Si), total mixed ration (TMR), Coefficient of determination in validation (R^2_v), Root mean square error in validation ($RMSE_v$), Standard normal variate (SNV)

Table S1: Coordinates, contributes, and cos², for individual variables used to perform the PCA and supplementary categories for the 19 farms studied in the cohort.

Variables															
	Dim.1	ctr	cos2	Dim.2	ctr	cos2	Dim.3	ctr	cos2	Dim.4	ctr	cos2	Dim.5	ctr	cos2
MW.augers.n	0.48	6.08	0.23	0.14	0.61	0.02	0.54	13.9	0.29	-0.60	25.8	0.36	0.11	1.13	0.01
MW.volume (m³)	0.28	2.11	0.08	0.24	1.90	0.06	0.68	22.5	0.47	-0.51	19.1	0.26	0.05	0.25	0.00
MW.total.time (sec)	0.72	14.1	0.52	-0.27	2.46	0.08	0.02	0.02	0.00	0.13	1.13	0.02	-0.36	11.4	0.13
Hi	-0.08	0.17	0.01	-0.72	17.2	0.52	0.27	3.57	0.07	0.11	0.88	0.01	0.39	13.2	0.15
Si	0.69	13.0	0.48	0.28	2.65	0.08	-0.17	1.30	0.03	0.37	9.98	0.14	0.19	3.10	0.04
GMPL (mm)	0.25	1.62	0.06	0.74	18.2	0.55	-0.10	0.52	0.01	0.02	0.02	0.00	0.32	9.04	0.10
milk.yield.farm (kg/day)	0.17	0.81	0.03	-0.29	2.85	0.09	0.67	21.4	0.45	0.45	14.6	0.20	0.00	0.00	0.00
mixer.wagon.fullness (%)	0.12	0.35	0.01	0.41	5.40	0.16	0.39	7.37	0.15	0.24	4.05	0.06	-0.65	36.9	0.42
DMI (Kg of the DM/day)	0.64	11.0	0.41	-0.15	0.74	0.02	0.49	11.7	0.24	0.33	7.78	0.11	0.06	0.27	0.00
DM (%)	0.10	0.25	0.01	-0.88	25.6	0.78	-0.01	0.01	0.00	0.01	0.00	0.00	0.19	3.18	0.04
aNDF (% of the DM)	0.78	16.5	0.61	0.30	3.00	0.09	-0.36	6.18	0.13	-0.07	0.35	0.01	-0.02	0.04	0.00
CP (% of the DM)	-0.72	13.9	0.52	0.40	5.31	0.16	0.40	7.52	0.16	0.02	0.02	0.00	0.15	2.05	0.02
Starch (% of the DM)	-0.78	16.4	0.61	-0.13	0.59	0.02	0.15	1.06	0.02	-0.01	0.01	0.00	-0.35	10.9	0.12
peNDF (% of the DM)	-0.37	3.65	0.14	0.64	13.53	0.41	0.25	3.02	0.06	0.47	16.2	0.22	0.31	8.48	0.10

Supplementary categories																
	Dim.1	cos2	v.test	Dim.2	cos2	v.test	Dim.3	cos2	v.test	Dim.4	cos2	v.test	Dim.5	cos2	v.test	Dist
MW self-propelled	-0.28	0.41	-1.20	0.03	0.00	0.14	-0.06	0.02	-0.35	-0.15	0.12	-1.06	0.16	0.13	1.20	0.44
MW towed	1.05	0.41	1.20	-0.11	0.00	-0.14	0.23	0.02	0.35	0.57	0.12	1.06	-0.58	0.13	-1.20	1.63
Hbhi	-0.36	0.08	-0.74	-1.04	0.67	-2.40	0.26	0.04	0.73	0.01	0.00	0.02	0.43	0.11	1.61	1.27
Ibhi	0.34	0.07	0.70	1.03	0.66	2.38	-0.30	0.05	-0.82	0.04	0.00	0.12	-0.44	0.12	-1.64	1.27
ESbsi	1.19	0.62	2.24	0.61	0.16	1.27	-0.38	0.06	-0.96	0.33	0.05	1.01	0.36	0.06	1.23	1.51
NSbsi	-1.31	0.76	-2.73	-0.60	0.16	-1.39	0.10	0.01	0.29	-0.27	0.03	-0.94	0.04	0.00	0.16	1.50
FMY-low (kg/day)	-0.27	0.05	-0.56	0.04	0.00	0.08	-0.95	0.63	-2.65	-0.62	0.27	-2.12	-0.16	0.02	-0.59	1.19
FMY-High (kg/day)	0.25	0.04	0.52	-0.04	0.00	-0.10	0.92	0.60	2.56	0.66	0.31	2.26	0.15	0.02	0.56	1.18

DM, dry matter of the TMR; CP, crude protein of the TMR; Hi, homogeneity index, Si, sorting index; GMPL, geometric mean of the particle size (mm); Ibhi (Inhomogeneous Hi ≤ 79%); Hbhi (homogeneous); NSbsi (negligible selection Si ≤ 0.30); ESbsi (evident selection, Si > 0.30); FMY-low: Farm milk yield < 35 kg/day; FMY-high: Farm milk yield ≥ 35 kg/day; MW, mixer wagon set.