

SUPPLEMENTARY TABLES

Table S1. Ingredient and composition of University of Wisconsin (UW) and Cornell University (CU) experimental prepartum diets.

Ingredient, % of DM	Farm/Treatments ^{1,2}			
	UW		CU	
	Control	RPM	Control	RPM
Corn silage	46.91	46.91	39.15	39.15
Wheat straw	28.82	28.82	28.47	28.47
Citrus pulp dry	-	-	4.58	4.58
Corn gluten feed dry	-	-	1.76	1.76
Soybean meal, 48% CP	10.23	10.23	-	-
Canola meal	10.23	10.23	3.52	3.52
Cooker processed solvent-extract soybean meal ³	-	-	7.04	7.04
Soybean hulls	-	-	3.78	3.78
Dried distillers grains	1.59	1.49	-	-
Calcium salts of fatty acids ⁴	-	-	0.88	0.88
Calcium carbonate	0.47	0.47	2.29	2.29
Anionic source supplement ⁶	-	-	5.28	5.28
Magnesium oxide	-	-	0.44	0.44
Magnesium sulfate	-	-	0.35	0.35
Rumen-protected methionine (RPM) ⁷	-	0.095	-	-
AA supplement (with RPM) ⁸	-	-	-	1.40
AA supplement (without RPM) ⁸	-	-	1.40	-
Vitamin-mineral mix ^{9,10}	1.73	1.73	1.06	1.06

^{1,2}CON: Basal diet = 2.30% and 2.09 % of Met as % MP (UW) and 2.22% or 2.19% of Met as % MP (CU) and RPM: Basal diet fed with rumen-protected Met with 2.83% and 2.58% of Met as % MP (UW) or 2.85% and 2.65% of Met as % MP (CU), all pre- and postpartum, respectively.

³AminoPlus (6.10% dRUP-Lys and 1.57% dRUP-Met as % DM [Ag Processing Inc., Omaha, NE: <https://www.agp.com/products/aminoplus-about>])

⁴Megalac-R (Church & Dwight Co., Inc., Arm & Hammer Animal Nutrition, Princeton, NJ)

⁵ProVAAL Advantage (5.8% dRUP-Lys and 0.7% dRUP-Met as % DM [Perdue Agribusiness; Salisbury, MD: <https://www.perdueagribusiness.com/precision-dairy-nutrition>]).

⁶Bio-Chlor (Church & Dwight Co., Inc., Arm & Hammer Animal Nutrition, Princeton, NJ)

⁷Smartamine M (Adisseo, Alpharetta, GA).

⁸LysAAMet (8.3% dRUP-Lys and 5.4% dRUP-Met as % DM [Perdue Agribusiness; Salisbury, MD: <https://www.perdueagribusiness.com/precision-dairy-nutrition>]). It was specifically formulated with the concentration of Smartamine M required to reach the grams of Met requirement for each diet.

⁹The UW prepartum vitamin-mineral mix contained (DM basis): 440.9 kIU/kg of vitamin A, 132.3 kIU/kg of vitamin D, 6.4 kIU/kg of vitamin E, 11.7 % Ca, 2.0 % P, 9.1 % Mg, 0.18 % K, 7.4 % S, 5.45 % Na, 8.1 % Cl, 39.7 ppm Co, 500 ppm Cu, 56.8 ppm I, 2,483 ppm Mn, 16.8 ppm Se, 2,688 ppm Zn and 768 ppm of Monensin (Rumensin 90, Elanco, Greenfield, IN).

¹⁰The CU prepartum vitamin-mineral mix contained (DM basis): 1178 kIU/kg of vitamin A, 330 kIU/kg of vitamin D, 15.0 kIU/kg of vitamin E, 14.4% Ca, 0.27% P, 2.70% Mg, 0.76% K, 3.02% S, 34.3 0.51% Na, 0.03% Cl, 108.4 ppm Co, 1673.0 ppm Cu, 51.4 ppm I, 2099.4 ppm Mn, 55.3 ppm Se, 5609.8 ppm Zn, and 2636.7 ppm of Monensin (Rumensin 80, Elanco, Greenfield, IN).

Table S2. Ingredient and composition of University of Wisconsin (UW) and Cornell University (CU) experimental postpartum diets.

Ingredient, % of DM	Farm/Treatments ^{1,2}			
	UW		CU	
	CON	RPM	CON	RPM
Corn silage	33.45	33.45	41.86	41.86
Alfalfa haylage	25.30	25.30	-	-
Mix mainly legume silage	-	-	11.16	11.16
Wheat straw	-	-	2.79	2.79
Alfalfa hay	-	-	1.86	1.86
Citrus pulp dry	-	-	1.86	1.86
High-moisture shelled corn	14.68	14.68	-	-
Corn meal fine	4.74	4.74	5.58	5.58
Steam flaked corn	-	-	8.37	8.37
Soybean meal, 48% CP	3.75	3.75	-	-
Canola meal	-	-	5.58	5.58
Expeller soybean meal ³	5.45	5.45	-	-
Cooker processed solvent-extract soybean meal ⁴	-	-	5.58	5.58
Dried distillers grains	0.74	0.65	-	-
Soybean hulls	5.15	5.15	3.72	3.72
Calcium salts of fatty acids ⁵	1.52	1.52	0.84	0.84
Dried molasses	-	-	3.72	3.72
AA supplement ⁶	1.41	1.41	-	-
White salt	-	-	0.46	0.46
Calcium carbonate	1.10	1.10	0.19	0.19
Sodium bicarbonate	0.72	0.72	1.49	1.49
Magnesium oxide	0.30	0.30	0.23	0.23
Potassium and magnesium sulfate ⁷	0.32	0.32	0.46	0.46
Urea	-	-	0.37	0.37
Potassium carbonate ⁸	-	-	0.74	0.74
Fermentation by-product ⁹	-	-	0.93	0.93
Rumen-protected methionine (RPM) ¹⁰	-	0.095	-	-
AA supplement (with RPM) ¹¹	-	-	-	1.20
AA supplement (without RPM) ¹¹	-	-	1.40	-
Vitamin-mineral mix ^{12,13}	0.36	0.36	0.99	0.99

^{1,2}CON: Basal diet = 2.30% and 2.09 % of Met as % MP (UW) and 2.22% or 2.19% of Met as % MP (CU) and RPM: Basal diet fed with rumen-protected Met with 2.83% and 2.58% of Met as % MP (UW) or 2.85% and 2.65% of Met as % MP (CU), all pre- and postpartum, respectively.

³Soy Plus (West Central Coop, Ralston, IA).

⁴AminoPlus (6.10% dRUP-Lys and 1.57% dRUP-Met as % DM [Ag Processing Inc., Omaha, NE: <https://www.agp.com/products/aminoplus-about>])

⁵UW: Energy Booster 100 (MSC, Carpentersville, IL); CU: Megalac-R (Church & Dwight Co., Inc., Arm & Hammer Animal Nutrition, Princeton, NJ).

⁶ProVAAL Advantage (5.8% dRUP-Lys and 0.7% dRUP-Met as % DM [Perdue Agribusiness; Salisbury, MD: <https://www.perdueagribusiness.com/precision-dairy-nutrition>]).

⁷Dynamate (The Mosaic Company, Plymouth, MN)

⁸DCAD Plus (Church & Dwight Co., Inc., Arm & Hammer Animal Nutrition, Princeton, NJ).

⁹Fermenten (Church & Dwight Co., Inc., Arm & Hammer Animal Nutrition, Princeton, NJ).

¹⁰Smartamine M (Adisseo, Alpharetta, GA).

¹¹LysAAmet (8.3% dRUP-Lys and 5.4% dRUP-Met as % DM [Perdue Agribusiness; Salisbury, MD: <https://www.perdueagribusiness.com>]). It was specifically formulated with the concentration of Smartamine M required to reach the grams of methionine requirement for each diet.

¹²The UW postpartum vitamin-mineral mix contained (DM basis): 2100 kIU/kg of vitamin A, 420 kIU/kg of vitamin D, 9.0 kIU/kg of vitamin E, 0.49% Ca, 0.001% P, 0.002% Mg, 0.005% K, 0.34% S, 34.3% Na, 51.5% Cl, 76.4 ppm Co, 4976.0 ppm Cu, 479.0 ppm I, 14,693 ppm Mn, 91.5 ppm Se, 21,157 ppm Zn, 1534.8 of Fe, 163.5 mg/kg of Biotin, 3664.2 ppm of Monensin (Rumensin 90, Elanco, Greenfield, IN).

¹³The CU postpartum vitamin-mineral mix contained (DM basis): 661.5 kIU/kg of vitamin A, 186 kIU/kg of vitamin D, 4.5 kIU/kg of vitamin E, 14.1% Ca, 2.96% P, 4.02% Mg, 0.06% K, 1.84% S, 0.01% Na, 0.0% Cl, 62.1 ppm Co, 37.6 ppm Cu, 24.5 ppm I, 844.5 ppm Mn, 29.5 ppm Se, 473.2 ppm Zn, 307.7 of Fe, mg/kg, 1272.5 ppm of Monensin (Rumensin 80, Elanco, Greenfield, IN).

Table S3. Chemical composition and AA evaluation (CNCPS v. 6.5.5) of University of Wisconsin (UW) and Cornell University (CU) experimental prepartum diets.

Chemical component	Farm/Treatments ^{1,2}			
	UW		CU	
	CON	RPM	CON	RPM
DM, % as fed	43.9 ± 2.0	44.1 ± 1.6	47.5 ± 2.3	47.8 ± 2.2
CP, % DM	14.5 ± 0.9	14.6 ± 0.8	15.6 ± 0.8	15.9 ± 1.1
NEL, Mcal/kg of DM	1.42 ± 0.02	1.43 ± 0.03	1.42 ± 0.04	1.44 ± 0.03
aNDFom, % DM	44.6 ± 1.8	44.3 ± 1.5	43.9 ± 2.6	43.0 ± 2.9
Starch, % DM	19.9 ± 1.4	20.2 ± 1.6	15.5 ± 2.2	15.8 ± 1.2
Water-soluble carbohydrates, % DM	2.8 ± 0.3	2.7 ± 0.4	5.2 ± 0.8	5.1 ± 0.5
NFC, % DM	33.0 ± 1.6	33.1 ± 2.1	29.5 ± 2.4	30.1 ± 2.6
EE, % DM	2.4 ± 0.4	2.4 ± 0.2	2.0 ± 0.3	2.1 ± 0.3
Ash, % of DM	8.6 ± 0.8	8.6 ± 0.9	10.4 ± 0.6	10.1 ± 1.0
Ca, % DM	0.73 ± 0.16	0.72 ± 0.13	2.23 ± 0.31	2.16 ± 0.38
P, % DM	0.37 ± 0.02	0.37 ± 0.02	0.30 ± 0.02	0.32 ± 0.02
Mg, % DM	0.41 ± 0.02	0.41 ± 0.02	0.47 ± 0.06	0.52 ± 0.06
K, % DM	1.23 ± 0.16	1.24 ± 0.14	1.27 ± 0.08	1.29 ± 0.08
Na, % DM	0.14 ± 0.01	0.13 ± 0.01	0.12 ± 0.01	0.12 ± 0.01
Cl, % DM	0.39 ± 0.07	0.39 ± 0.08	0.66 ± 0.05	0.65 ± 0.07
S, % DM	0.31 ± 0.03	0.33 ± 0.02	0.47 ± 0.03	0.52 ± 0.03
DCAD, mEq/100 g of DM	+ 6.9 ± 2.6	+ 6.2 ± 1.1	-10.1 ± 2.6	-12.9 ± 1.9
His, % of MP ³	2.63	2.61	3.03	3.03
His, g/d ³	31.3	31.2	39.1	39.1
Lys, % of MP ³	7.03	7.00	7.46	7.46
Lys, g/d ³	83.5	83.5	96.3	96.4
Lys, g/Mcal ME ³	2.94	2.94	3.43	3.43
Met, % of MP ³	2.30	2.83	2.22	2.85
Met, g/d ³	27.2	33.7	28.7	36.8
Met g/Mcal ME ³	0.96	1.18	1.02	1.31
Lys:Met ratio ³	3.07	2.48	3.36	2.62

^{1,2}CON: Basal diet = 2.30% and 2.09 % of Met as % MP (UW) and 2.22% or 2.19% of Met as % MP (CU) and RPM: Basal diet fed with rumen-protected Met with 2.83% and 2.58% of Met as % MP (UW) or 2.85% and 2.65% of Met as % MP (CU), all pre- and postpartum, respectively.

³Estimated by using CNCPS v. 6.5.5 as implemented by AMTS.Cattle.Professional v. 4.7.2.

Table S4. Chemical composition and AA evaluation (CNCPS v. 6.5.5) of University of Wisconsin (UW) and Cornell University (CU) experimental postpartum diets.

Chemical component	Farm/Treatments ^{1,2}			
	UW		CU	
	Control	RPM	Control	RPM
DM, % as fed	46.1 ± 1.6	45.7 ± 1.5	47.3 ± 2.0	47.2 ± 2.0
CP, % DM	16.0 ± 0.3	16.0 ± 0.5	16.8 ± 0.8	16.8 ± 0.6
NEL, Mcal/kg of DM	1.69 ± 0.02	1.68 ± 0.03	1.63 ± 0.05	1.60 ± 0.06
aNDFom, % DM	28.9 ± 1.5	29.4 ± 1.5	30.1 ± 2.3	30.7 ± 3.8
Starch, % DM	30.1 ± 1.8	29.6 ± 2.1	27.3 ± 1.9	25.4 ± 3.4
Water-soluble carbohydrates, % DM	2.8 ± 0.4	2.7 ± 0.5	5.5 ± 0.9	5.9 ± 0.8
NFC, % DM	45.7 ± 1.5	45.4 ± 1.7	43.3 ± 1.5	42.2 ± 3.3
EE, % DM	4.7 ± 0.2	4.6 ± 0.2	2.8 ± 0.3	2.7 ± 0.4
Ash, % DM	7.4 ± 0.4	7.4 ± 0.4	8.7 ± 0.4	9.1 ± 0.4
Ca, % DM	0.75 ± 0.08	0.74 ± 0.07	0.94 ± 0.10	1.06 ± 0.21
P, % DM	0.31 ± 0.01	0.31 ± 0.03	0.38 ± 0.01	0.37 ± 0.02
Mg, % DM	0.43 ± 0.03	0.43 ± 0.02	0.45 ± 0.05	0.44 ± 0.06
K, % DM	1.47 ± 0.09	1.49 ± 0.11	1.96 ± 0.11	1.93 ± 0.15
Na, % DM	0.36 ± 0.01	0.36 ± 0.01	0.77 ± 0.06	0.78 ± 0.13
Cl, % DM	0.44 ± 0.06	0.44 ± 0.05	0.51 ± 0.05	0.54 ± 0.04
S, % DM	0.21 ± 0.01	0.22 ± 0.01	0.42 ± 0.04	0.43 ± 0.01
DCAD, mEq/100 g fo DM	+27.6 ± 1.8	+27.8 ± 1.9	+43.4 ± 2.2	+41.7 ± 8.5
His, % of MP ³	2.76	2.75	2.89	2.88
His, g/d ³	86.6	85.8	110.2	110.2
Lys, % of MP ³	6.78	6.75	7.09	7.07
Lys, g/d ³	212.6	209.3	215.3	217.2
Lys, g/Mcal ME ³	3.02	3.02	3.24	3.26
Met, % of MP	2.09	2.58	2.19	2.65
Met, g/d ³	65.6	80.4	70.8	89.6
Met g/Mcal ME ³	0.93	1.15	1.00	1.22
Lys:Met ratio ³	3.24	2.62	3.25	2.67

^{1,2}CON: Basal diet = 2.30% and 2.09 % of Met as % MP (UW) and 2.22% or 2.19% of Met as % MP (CU) and RPM: Basal diet fed with rumen-protected Met with 2.83% and 2.58% of Met as % MP (UW) or 2.85% and 2.65% of Met as % MP (CU), all pre- and postpartum, respectively.

³Estimated by using CNCPS v. 6.5.5 as implemented by AMTS.Cattle.Professional v. 4.7.2.

Dietary evaluation was based on cow and performance input. The DMI is based on final pen DMI when pens were full only with cows enrolled on the study.