Effect of increased milking frequency and residual milk removal on milk production and milk fatty acid composition in lactating cows

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SUPPLEMENTARY FILE

Supplementary Table S1. Effect of two (2x) or four (4x) times daily milking combined without or with residual milk removal (RMR) on milk C16:1 and C16:2 concentrations

	Available milk								Residual milk								Available vs residual			
	Treatments[1]					P-values[2]			Treatments[1]					P-values[2]			P-values[3]			
g/100 g fatty acids	2x	2xRMR	4x	4xRMR	SEM	MF	RMR	MRxRMR	2x	2xRMR	4x	4xRMR	SEM	MF	RMR	MFxRMR	2x	2xRMR	4x	4xRMR
trans-4 16:1	0.0033	0.0043	0.0020	0.0043	0.00106	0.568	0.158	0.568	0.0053	0.0040	0.0040	0.0033	0.00079	0.246	0.246	0.759	0.320	0.718	0.201	0.546
trans-5 16:1	0.0045	0.0075	0.0048	0.0075	0.00176	0.941	0.124	0.941	0.0273	0.0065	0.0133	0.0058	0.00810	0.344	0.097	**0.039**	0.206	0.530	0.407	0.614
trans-6-8 16:1	0.047	0.053	0.045	0.049	0.0036	0.383	0.181	0.725	0.043	0.048	0.045	0.051	0.0027	0.256	**0.033**	0.810	0.519	0.423	0.976	0.593
trans-9 16:1	0.048	0.058	0.051	0.053	0.0033	0.621	**0.046**	0.169	0.046	0.548	0.050	0.055	0.0028	0.240	**0.007**	0.350	0.693	0.182	0.731	0.529
trans-12 16:1	0.019	0.021	0.019	0.018	0.0026	0.440	0.818	0.552	0.028	0.023	0.029	0.022	0.0029	0.934	0.073	0.679	**0.011**	0.581	**0.040**	0.235
trans-13 16:1	0.018	0.019	0.017	0.017	0.0017	0.376	0.625	0.833	0.018	0.017	0.017	0.018	0.0030	0.925	0.925	0.778	0.874	0.439	0.953	0.950
cis-9 16:1	1.17	1.15	1.07	1.24	0.095	0.825	**0.023**	**0.006**	1.17	1.12	1.06	1.116	0.10200	0.119	0.976	0.137	0.999	0.094	0.970	**0.032**
cis-11 16:1	0.025	0.030	0.025	0.031	0.0029	0.885	**0.019**	0.772	0.025	0.028	0.027	0.026	0.0028	0.702	0.273	0.063	0.866	0.509	0.595	0.360
cis-15 16:1	0.24	0.28	0.23	0.30	0.037	0.756	0.081	0.519	0.22	0.21	0.22	0.28	0.027	0.062	0.134	0.066	0.390	**0.031**	0.818	0.394
trans-9,*trans*-13 16:2	0.0093	0.0038	0.0088	0.0085	0.00123	0.091	**0.035**	**0.048**	0.0063	0.0070	0.0100	0.0060	0.00178	0.426	0.352	0.191	0.302	0.168	0.431	0.368
cis-9,*cis*-12 16:2	0.0033	0.0015	0.0035	0.0018	0.00044	0.585	**0.003**	1.000	0.0033	0.0038	0.0043	0.0020	0.00080	0.639	0.294	0.121	1.000	**0.018**	0.391	0.789

[1]Values represent least square means of measurements made for samples collected from four cows at the end of a 96 h treatment period.

[2]Probability of effects due to milking frequency (MF), residual milk removal (RMR) and their interaction (MF×RMR). Bold typeface indicates significant differences ($P \leq 0.05$)

[3]Probability of differences between available and residual milk collected on the last milking during each treatment period. Bold typeface indicates significant differences ($P \leq 0.05$).

Supplementary Table S2. Effect of two (2x) or four (4x) times daily milking combined without or with residual milk removal (RMR) on milk odd and branched chain fatty acid concentrations

	Available milk								Residual milk								Available vs residual			
	Treatments[1]					P-values[2]			Treatments[1]					P-values[2]			P-values[3]			
g/100 g fatty acids	2x	2xRMR	4x	4xRMR	SEM	MF	RMR	MFxRMR	2x	2xRMR	4x	4xRMR	SEM	MF	RMR	MFxRMR	2x	2xRMR	4x	4xRMR
5:0	0.029	0.027	0.030	0.030	0.0014	0.113	0.559	0.457	0.032	0.028	0.032	0.029	0.0021	0.813	0.134	0.638	0.072	0.194	0.534	0.092
7:0	0.031	0.023	0.030	0.029	0.0025	0.291	0.112	0.195	0.032	0.025	0.033	0.028	0.0025	0.508	**0.050**	0.634	0.722	0.096	0.426	0.353
9:0	0.043	0.031	0.042	0.042	0.0037	0.213	0.147	0.161	0.043	0.034	0.044	0.039	0.0040	0.471	0.092	0.671	0.919	**0.032**	0.646	0.164
11:0	0.076	0.055	0.076	0.076	0.0074	0.218	0.218	0.208	0.076	0.058	0.079	0.071	0.0077	0.326	0.120	0.532	0.980	**0.035**	0.736	0.461
13:0	0.10	0.09	0.11	0.11	0.008	0.279	0.355	0.430	0.10	0.09	0.11	0.10	0.008	0.273	0.216	0.811	0.814	0.718	0.899	0.311
*iso*13:0	0.020	0.022	0.019	0.018	0.0025	0.132	0.812	0.396	0.019	0.021	0.018	0.019	0.0025	0.287	0.510	0.605	0.787	0.215	0.872	0.911
*anteiso*13:0	0.0073	0.0095	0.0073	0.0075	0.00089	0.302	0.208	0.302	0.0063	0.0080	0.0068	0.0073	0.00079	0.878	0.189	0.450	0.423	0.103	0.718	0.824
cis-9 13:1	0.0078	0.0058	0.0073	0.0080	0.00122	0.440	0.576	0.242	0.0060	0.0053	0.0065	0.0060	0.00123	0.580	0.580	0.911	0.340	0.495	0.761	0.295
*iso*14:0	0.080	0.088	0.083	0.077	0.0095	0.408	0.777	0.136	0.077	0.087	0.081	0.082	0.0098	0.979	0.272	0.363	0.852	0.375	0.893	0.662
15:0	1.03	1.02	1.03	1.03	0.029	0.691	0.755	1.000	1.01	1.01	1.03	1.00	0.030	0.764	0.529	0.491	0.758	0.128	0.953	0.240
*iso*15:0	0.19	0.21	0.19	0.18	0.017	0.086	0.448	**0.034**	0.18	0.20	0.19	0.19	0.019	0.508	0.161	0.106	0.821	**0.008**	0.909	0.769
*anteiso*15:0	0.42	0.41	0.43	0.40	0.024	0.895	0.244	0.418	0.40	0.40	0.42	0.42	0.024	0.387	0.944	0.944	0.687	0.106	0.340	0.098
R2,R6,R10,14-tetramethyl-15:0	0.0070	0.0195	0.0095	0.0180	0.00409	0.880	**0.016**	0.551	0.0040	0.0060	0.0050	0.0143	0.00190	**0.020**	**0.009**	**0.050**	0.387	**0.024**	0.522	0.499
trans-5 15:1	0.052	0.049	0.051	0.047	0.0028	0.313	0.087	0.764	0.052	0.050	0.051	0.052	0.0040	0.939	0.819	0.596	0.927	0.591	0.964	0.285
trans-6 15:1	0.028	0.027	0.027	0.024	0.0024	0.151	0.211	0.510	0.028	0.028	0.027	0.026	0.0028	0.390	0.660	0.513	1.000	0.252	0.671	**0.035**
cis-9 15:1	0.012	0.015	0.011	0.014	0.0027	0.531	0.093	0.832	0.010	0.010	0.010	0.014	0.0015	**0.005**	**0.017**	**0.005**	0.465	0.109	0.960	0.813
*iso*16:0	0.18	0.20	0.20	0.18	0.020	0.826	0.907	0.061	0.18	0.19	0.19	0.19	0.022	0.597	0.483	0.302	0.936	0.059	0.811	0.562
17:0	0.39	0.41	0.41	0.40	0.017	0.708	0.952	0.398	0.39	0.41	0.41	0.40	0.016	0.467	0.664	0.251	0.918	0.798	0.977	0.916
*iso*17:0	0.38	0.40	0.39	0.37	0.010	0.226	0.813	**0.034**	0.38	0.40	0.39	0.39	0.008	0.923	0.307	0.246	0.935	0.358	0.899	0.250
*anteiso*17:0	0.36	0.36	0.36	0.34	0.024	0.733	0.786	0.777	0.34	0.35	0.36	0.36	0.022	0.608	0.752	0.777	0.569	0.133	0.981	0.108
S3,R7,R11,15-tetramethyl-16:0 + R3,R7,R11,15-tetramethyl-16:0	0.10	0.10	0.12	0.91	0.032	0.907	0.608	0.608	0.06	0.08	0.07	0.06	0.011	0.561	0.414	0.211	0.379	0.481	0.329	0.233
trans-6 17:1	0.015	0.012	0.014	0.014	0.0007	0.271	**0.020**	0.072	0.014	0.014	0.014	0.016	0.0013	0.356	0.482	0.635	0.547	0.078	0.926	0.456
cis-9 17:1	0.12	0.13	0.12	0.12	0.006	0.109	0.655	1.000	0.12	0.12	0.12	0.12	0.006	0.115	0.818	0.453	0.891	0.854	0.937	0.359
*iso*18:0	0.10	0.11	0.10	0.09	0.009	0.177	0.839	0.104	0.10	0.11	0.10	0.10	0.008	0.130	0.476	0.078	0.944	0.468	0.955	0.082
cis-9 19:1	0.084	0.083	0.079	0.085	0.0062	0.788	0.666	0.581	0.077	0.076	0.081	0.083	0.0040	0.068	0.814	0.545	0.429	0.158	0.851	0.669
cis-11 19:1	0.013	0.010	0.015	0.009	0.0033	0.723	0.166	0.598	0.015	0.012	0.016	0.007	0.0032	0.651	0.094	0.373	0.638	0.485	0.843	0.408
cis-12 19:1	0.007	0.005	0.004	0.003	0.0016	0.121	0.335	0.651	0.002	0.005	0.003	0.006	0.0008	0.074	**0.001**	0.680	0.086	0.928	0.690	0.266
23:0	0.038	0.021	0.038	0.024	0.0062	0.754	**0.032**	0.814	0.059	0.034	0.056	0.045	0.0095	0.691	0.099	0.443	**0.011**	0.069	0.224	0.344
cis-14 23:1	0.043	0.047	0.041	0.036	0.0101	0.295	0.983	0.431	0.052	0.052	0.052	0.040	0.0095	0.496	0.496	0.515	0.651	0.260	0.529	0.448
25:0	0.0115	0.0168	0.0120	0.0080	0.00537	0.462	0.910	0.412	0.0050	0.0103	0.0120	0.0080	0.00362	0.493	0.854	0.205	0.294	0.389	1.000	1.000

[1]Values represent least square means of measurements made for samples collected from four cows at the end of a 96 h treatment period.

[2]Probability of effects due to milking frequency (MF), residual milk removal (RMR) and their interaction (MF×RMR). Bold typeface indicates significant differences ($P \leq 0.05$).

[3]Probability of differences between available and residual milk collected on the last milking during each treatment period. Bold typeface indicates significant differences ($P \leq 0.05$).