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Effects of starch-rich or lipid-supplemented diets that induce milk fat depression on lipid metabolism and methanogenesis in lactating dairy cows

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**Table S1** *Concentrations of minor fatty acids (FA) in milk fat from dairy cows fed the 4 experimental diets1*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Fatty acid(g/100 g of total FA) | PALM | MFD-Starch | MFD-RS | MFD-SF | SEM | *P*-values |
| C5:0 | 0.01b | 0.03a | 0.01a | 0.01ab | 0.002 | 0.01 |
| C7:0 | 0.01b | 0.02a | 0.01ab | 0.01b | 0.002 | 0.03 |
| C9:0 | 0.006b | 0.015a | 0.008ab | 0.005b | 0.002 | 0.04 |
| *cis*-9 C10:1 | 0.07b | 0.17a | 0.12ab | 0.06b | 0.023 | < 0.01 |
| C11:0 | 0.01 | 0.03 | 0.02 | 0.01 | 0.005 | 0.13 |
| *cis*-9 C12:1 | 0.007 | 0.009 | 0.008 | 0.008 | 0.0008 | 0.07 |
| C13:0 | 0.03 | 0.07 | 0.05 | 0.05 | 0.01 | 0.20 |
| *iso* C13:0 | 0.02 | 0.003 | 0.02 | 0.03 | 0.0053 | 0.70 |
| *anteiso* C13:0 | 0.02 | 0.06 | 0.05 | 0.03 | 0.011 | 0.16 |
| *trans*-9 C14:1 | 0.010 | 0.014 | 0.015 | 0.011 | 0.0025 | 0.33 |
| *cis*-11 C16:1 | 0.04 | 0.05 | 0.05 | 0.03 | 0.009 | 0.49 |
| *trans*-6,7,8 C16:1 | 0.05b | 0.04c | 0.06a | 0.06a | 0.004 | 0.002 |
| *iso* C18:0 | 0.03c | 0.07a | 0.04b | 0.04b | 0.003 | 0.0001 |
| *cis*-9 C20:1 | 0.10b | 0.10b | 0.14a | 0.11ab | 0.010 | 0.04 |
| *cis*-11 C20:1 | 0.08b | 0.10b | 0.25a | 0.10b | 0.0151 | 0.0001 |
| C20:0 | 0.11 | 0.10 | 0.16 | 0.11 | 0.019 | 0.20 |
| C21:0 | 0.02 | 0.03 | 0.03 | 0.04 | 0.005 | 0.34 |
| C22:0 | 0.03 | 0.03 | 0.06 | 0.06 | 0.009 | 0.05 |
| C23:0 | 0.02 | 0.03 | 0.03 | 0.02 | 0.006 | 0.75 |
| C24:0 | 0.02 | 0.03 | 0.04 | 0.02 | 0.004 | 0.10 |
| C20:2n-6 | 0.04 | 0.04 | 0.03 | 0.05 | 0.004 | 0.09 |
| C20:3n-6 | 0.06b | 0.10a | 0.06b | 0.07b | 0.007 | 0.009 |
| C22:4n-6 | 0.01ab | 0.03a | 0.02b | 0.02b | 0.003 | 0.02 |

1PALM = diet with Ca salts of palm oil; MFD = milk fat depression; MFD-Starch = diet rich in starch, MFD-RS = diet with extruded rapeseed, MFD-SF = diet with extruded sunflower seeds.

a,b,c Values within a row with different superscripts differ significantly at *P* < 0.05.

**Table S2** *Pearson correlation coefficient1 (r) between milk fatty acid (FA) concentrations (g/100 g of total FA) and milk fat content (g/kg) in dairy cows fed the 4 experimental diets2 (n=16)*

|  |  |
| --- | --- |
| Item | r |
| C16 :0 | 0.65 |
| Even SFA3 | 0.64 |
| SFA | 0.62 |
| *trans*-11,*cis*-13 CLA4 | 0.57 |
| *trans*-9,*trans*-11 CLA | 0.52 |
| *trans*-13 C18:1 | -0.50 | |
| *cis*-13 C18:1 | -0.54 | |
| *trans*-5 C18:1 | -0.54 | |
| C18:2n-6 | -0.54 | |
| C21:0 | -0.54 | |
| *cis*-9,*trans*-12 C18:2 (+*cis*-9,*trans*-14 C18:2) | -0.55 | |
| MUFA5 | -0.55 | |
| *trans*-6,7,8 C18:1 | -0.57 | |
| *trans*-6,7,8 C16:1 | -0.59 | |
| *trans*-12 C18:1 (+*cis*-6,7,8 C18:1) | -0.59 | |
| *cis*-16 C18:1 | -0.62 | |
| PUFA6 | -0.62 | |
| *cis*-9,*trans*-13 C18:2 | -0.63 | |
| iso 17:0 (+ *trans*-9 C16:1) | -0.73 | |
| *trans*-10 C18:1 | -0.77 | |

1Only r ≥ 0.50 or r ≤ −0.50 (*P* < 0.05) are reported.

2PALM = diet with Ca salts of palm oil; MFD = milk fat depression; MFD-Starch = diet rich in starch, MFD-RS = diet with extruded rapeseed, MFD-SF = diet with extruded sunflower seeds.

3SFA: Saturated fatty acids.

4 CLA = conjugated linoleic acid

5MUFA: Monounsaturated fatty acids.

6PUFA: Polyunsaturated fatty acids.

**Table S3** *Total-tract apparent digestibility of the 4 experimental diets in dairy cows1*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Items (%) | PALM | MFD-Starch | MFD-RS | MFD-SF | SEM | *P*-value |
| Organic matter | 68.9 | 68.9 | 70.0 | 70.6 | 0.72 | 0.29 |
| CP | 49.9 | 49.4 | 49.0 | 51.9 | 1.71 | 0.64 |
| NDF | 58.0 | 57.5 | 60.0 | 62.1 | 1.13 | 0.06 |
| ADF | 49.1bc | 46.4c | 51.0ab | 54.0a | 1.39 | 0.02 |
| Starch | 96.7b | 98.3a | 98.1a | 97.6ab | 0.56 | 0.02 |
| Gross energy | 64.8 | 64.0 | 64.8 | 65.9 | 1.21 | 0.75 |

1PALM = diet with Ca salts of palm oil; MFD-Starch = milk fat depression (MFD) diet rich in starch, MFD-RS = diet with extruded rapeseed, MFD-SF = diet with extruded sunflower seeds.

a, b, c Values within a row with different superscripts differ significantly at *P* < 0.05.

**Table S4** *Pearson correlation coefficient1(r) between individual milk fatty acid (FA, g/100 g of total FA) and methane emissions (in different units) in dairy cows fed the 4 experimental diets2*

|  |  |  |  |
| --- | --- | --- | --- |
|  | r | | |
| Item | CH4 g/d | CH4 g/kg of DMI | CH4 g/kg of milk |
| C4:0 | 0.52 |  |  |
| C16:0 |  |  | 055 |
| Odd-chain milk FA |  |  | -0.50 |
| *iso* 17:0 (+ *trans*-9 C16:1) |  | -0.50 | -0.53 |
| *cis*-11 C18:1 |  | -0.51 |  |
| *trans*-9,cis-12 C18:2  (+ *trans*-10 C19:1) | -0.62 | -0.70 | -0.69 |
| C18:3n-3 |  |  | -0.58 |
| PUFAn-3 |  |  | -0.53 |

1Only r ≥ 0.50 or r ≤ −0.50 (*P* < 0.05) are reported.

2PALM = diet with Ca salts of palm oil; MFD-Starch = diet rich in starch, MFD-RS = diet with extruded rapeseed, MFD-SF = diet with extruded sunflower seeds.

DMI = Dry Matter Intake; PUFA = Polyunsaturated fatty acids.