**Predicting duodenal flows and absorption of fatty acids from dietary characteristics in ovine and bovine species: a meta-analysis approach**

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**Supplementary material**



**Supplementary Figure S1** PRISMA diagram with details of the selection steps for the publications from the last database update. Npub, number of publications.

**Supplementary Table S1** *Treatment coding according to lipid source and technological process of the main studied feedstuffs in diets*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Forage diet |  | Seed |  | Vegetable oil or animal fat |  | (number of treatments) |
|  | Untreated |  | Control1 | Raw | Dry and Hydrothermal processes | Mechanical process | Formaldehyde |  | Control1 | Free | Amide | Ca salts | Encapsulated | Formaldehyde |  |
| Forage diet | 48 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 48 |
| Control |  |  | 32 |  |  |  |  |  | 66 |  |  |  |  |  |  | 98 |
| Lipid source |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cottonseed |  |  | 9 | 1 | 2 |  |  |  |  |  |  |  |  |  | 12 |
| Linseed |  |  | 4 | 10 | 1 |  |  |  | 13 |  |  | 1 | 3 |  | 32 |
| Palm |  |  |  |  |  |  |  |  | 3 |  | 15 |  |  |  | 18 |
| Rapeseed |  |  | 3 | 4 | 4 |  |  |  | 7 | 1 | 5 |  |  |  | 24 |
| Soybean |  |  | 4 | 6 | 2 |  |  |  | 14 | 3 | 5 | 1 |  |  | 35 |
| Sunflower |  |  | 2 | 1 | 2 |  |  |  | 12 |  |  |  | 1 |  | 18 |
| Other plants |  |  | 19 | 11 |  | 4 |  |  | 12 | 1 |  | 2 | 3 |  | 52 |
| Animal fat |  |  |  |  |  |  |  |  | 24 |  | 1 |  | 2 |  | 27 |
| Fish |  |  |  |  |  |  |  |  | 36 |  | 1 |  | 5 |  | 42 |
| Hydrogenated fat |  |  |  |  |  |  |  |  |  | 11 |  | 1 | 3 | 2 |  | 17 |
| Blend of Animal-vegetable fat |  |  |  |  |  |  |  |  |  | 14 |  |  |  |  |  | 14 |
| Total(number of treatments) | 48 |  | 32 | 41 | 33 | 11 | 4 |  | 66 | 146 | 5 | 28 | 7 | 16 |  | 437 |

1 without lipid supplementation.

**Supplementary Table S2** *Description of Forage subset with intake level, concentrate percentage, diet chemical composition, duodenal fatty acid (****FA****) flows and digestive parameters calculated by Systool (ruminal pH, digestible organic matter (****dMO****)**and acetate/propionate ratio) according to conservation mode of forage (fresh or pasture, silage and hay)*

|  |  |
| --- | --- |
|  | Mode of conservation |
|  | Fresh |  | Hay |  | Silage |
|  | Ntrt | mean ± s.e. |  | Ntrt | mean ± s.e. |  | Ntrt | mean ± s.e. |
| Intake level, % BW | 17 | 2.1 ± 0.07 |  | 13 | 2.4 ± 0.19 |  | 35 | 2.6 ± 0.12 |
| Percentage of concentrate, % | 17 | 2.1 ± 2.11 |  | 13 | 9.5 ± 5.1 |  | 35 | 9.6 ± 2.84 |
| Intake (g/kg of DMI1) |  |  |  |  |  |  |  |  |
|  Crude protein  | 8 | 129 ± 14.8 |  | 5 | 127.1 ± 26.7 |  | 26 | 175 ± 7.00 |
|  NDF  | 8 | 508 ± 24.9 |  | 3 | 507 ± 100 |  | 30 | 465 ± 17.5 |
|  Starch  |  |  |  |  |  |  | 15 | 50.3 ± 9.80 |
|  Total FA  | 16 | 21.1 ± 1.63 |  | 13 | 18.9 ± 3.76 |  | 35 | 23.0 ± 1.38 |
| FA intake (g/kg of DMI) |  |  |  |  |  |  |  |  |
| C14:0 | 10 | 0.1 ± 0.04 |  | 11 | 0.2 ± 0.06 |  | 24 | 0.3 ± 0.03 |
| C16:0 | 10 | 3.2 ± 0.21 |  | 13 | 3.7 ± 0.73 |  | 29 | 4.7 ± 0.44 |
| C18:0 | 10 | 0.3 ± 0.04 |  | 13 | 0.9 ± 0.39 |  | 29 | 0.6 ± 0.14 |
| c9-C16:1 | 8 | 0.2 ± 0.05 |  | 12 | 0.4 ± 0.17 |  | 25 | 0.1 ± 0.02 |
| c9-C18:1 | 7 | 0.4 ± 0.19 |  | 3 | 0.28 ± 0.05 |  | 28 | 0.6 ± 0.37 |
| c9c12-C18:2 | 9 | 3.2 ± 0.49 |  | 4 | 2.8 ± 0.69 |  | 26 | 3.8 ± 0.27 |
| c9c12c15-C18:3 | 9 | 9.9 ± 1.43 |  | 5 | 4.6 ± 1.09 |  | 28 | 8.3 ± 0.71 |
| Duodenal flows (g/kg of DMI) |  |  |  |  |  |  |  |  |
| Total FA  | 16 | 20.4 ± 5.1 |  | 9 | 17.3 ± 8.2 |  | 22 | 24.1 ± 12.1 |
| C14:0 | 9 | 0.3 ± 0.07 |  | 11 | 0.4 ± 0.12 |  | 24 | 0.35 ± 0.04 |
| C16:0 | 10 | 2.7 ± 0.36 |  | 12 | 3.1 ± 0.85 |  | 24 | 3.9 ± 0.61 |
| C18:0 | 10 | 8.8 ± 1.31 |  | 12 | 8.2 ± 1.67 |  | 34 | 9.8 ± 0.63 |
|  c9-C16:1 | 9 | 0.3 ± 0.09 |  | 11 | 0.4 ± 0.20 |  | 24 | 0.1 ± 0.03 |
| c9-C18:1 | 7 | 0.4 ± 0.07 |  | 3 | 0.3 ± 0.03 |  | 28 | 0.6 ± 0.07 |
| c9c12-C18:2 | 8 | 0.4 ± 0.06 |  | 3 | 0.3 ± 0.07 |  | 22 | 0.6 ± 0.12 |
| c9c12c15-C18:3 | 8 | 0.5 ± 0.10 |  | 3 | 0.4 ± 0.20 |  | 20 | 0.9 ± 0.12 |
| dMO, % | 12 | 78.6 ± 1.36 |  | 5 | 72.1 ± 2.87 |  | 5 | 70.0 ± 3.00 |
| Rumen pH | 5 | 6.3 ± 0.10 |  | 3 | 6.3 ± 0.10 |  | 23 | 6.5 ± 0.04 |
| Acetate/propionate ratio | 12 | 3.4 ± 0.31 |  | 3 | 3.6 ± 0.22 |  | 19 | 3.6 ± 0.05 |

1 DMI = DM intake.

Ntrt = number of treatments

**Supplementary Table S3** *Description of Forage subset with intake level, concentrate percentage, diet chemical composition, duodenal fatty acid (****FA****) flows and digestive parameters calculated by Systool (ruminal pH, digestible organic matter (****dMO****), and acetate/propionate ratio) according to botanical families of forages (Graminae or Leguminosae)*

|  |  |
| --- | --- |
|  | Botanical families |
|  | Graminae |  | Leguminosae |  |
|  | Ntrt | mean ± s.e. |  | Ntrt | mean ± s.e. |  |
| Intake level, % BW | 39 | 2.28 ± 0.09 |  | 17 | 2.60 ± 0.19 |  |
| Percentage of concentrate, % | 39 | 5.77 ± 2.20 |  | 17 | 12.1 ± 4.79 |  |
| Intake (g/kg of DMI1) |  |  |  |  |  |  |
|  Crude protein  | 18 | 126 ± 9.29 |  | 13 | 192 ± 8.82 |  |
|  NDF | 20 | 543 ± 16.6 |  | 12 | 384 ± 20.7 |  |
|  Starch  | 5 | 35.6 ± 17.2 |  | 5 | 65.8 ± 16.3 |  |
|  Total FA  | 38 | 19.5 ± 1.32 |  | 17 | 25.8 ± 2.81 |  |
| FA intake (g/kg of DMI) |  |  |  |  |  |  |
| C14:0 | 27 | 0.16 ± 0.03 |  | 12 | 0.26 ± 0.05 |  |
| C16:0 | 31 | 3.63 ± 0.42 |  | 14 | 5.16 ± 0.62 |  |
| C18:0 | 31 | 0.40 ± 0.06 |  | 14 | 1.30 ± 0.40 |  |
| c9-C16:1 | 14 | 0.051 ± 0.007 |  | 3 | 0.08 ± 0.02 |  |
| c9-C18:1 | 25 | 1.15 ± 0.20 |  | 7 | 0.46 ± 0.05 |  |
| c9c12-C18:2 | 25 | 3.30 ± 0.31 |  | 7 | 3.72 ± 0.44 |  |
| c9c12c15-C18:3 | 28 | 7.77 ± 0.80 |  | 7 | 8.31 ± 1.33 |  |
| Duodenal flows (g/kg of DMI) |  |  |  |  |  |  |
| Total FA  | 30 | 22.2 ± 2.11 |  | 11 | 19.6 ± 1.86 |  |
| C14:0 | 26 | 0.30 ± 0.05 |  | 12 | 0.41 ± 0.10 |  |
| C16:0 | 28 | 3.10 ± 0.58 |  | 12 | 4.18 ± 0.67 |  |
| C18:0 | 32 | 8.50 ± 0.86 |  | 15 | 10.5 ± 0.99 |  |
| c9-C16:1 | 15 | 4.20 ± 1.56 |  | 3 | 0.06 ± 0.01 |  |
| c9-C18:1 | 20 | 0.47 ± 0.05 |  | 10 | 0.62 ± 0.17 |  |
| c9c12-C18:2 | 20 | 0.53 ± 0.14 |  | 7 | 0.50 ± 0.08 |  |
| c9c12c15-C18:3 | 18 | 0.51 ± 0.06 |  | 7 | 1.03 ± 0.28 |  |
| dMO, % | 39 | 68.4 ± 1.07 |  | 17 | 69.9 ± 1.59 |  |
| Rumen pH | 16 | 6.34 ± 0.06 |  | 8 | 6.47 ± 0.06 |  |
| Acetate/propionate ratio | 20 | 3.50 ± 0.19 |  | 8 | 3.51 ± 0.07 |  |

1 DMI = DM intake.

Ntrt = number of treatments

**Supplementary Table S4** *Description of the Seed and Oil/fat subsets with intake level, concentrate percentage, diet chemical composition, duodenal fatty acid (****FA****) flows and digestive parameters (ruminal pH, digestible organic matter (****dMO****), and acetate/propionate ratio) with or without lipid supplementation*

|  |  |  |  |
| --- | --- | --- | --- |
|  | Seed subset |  | Oil/fat subset |
|  | Control | With LS1 |  | Control | With LS |
|  | Ntrt | mean ± s.e. | Ntrt | mean ± s.e. |  | Ntrt | mean ± s.e. | Ntrt | mean ± s.e. |
| Intake level, % BW | 20 | 2.3 ± 0.15 | 109 | 2.3 ± 0.07 |  | 47 | 2.8 ± 0.14 | 139 | 2.7 ± 0.07 |
| Percentage of concentrate, % | 20 | 42.8 ± 6.5 | 109 | 60.7 ± 2.30 |  | 47 | 55.7 ± 2.7 | 139 | 54.9 ± 1.58 |
| Intake (g/kg of DMI2) |  |  |  |  |  |  |  |  |  |
|  Crude protein  | 18 | 135 ± 7.80 | 91 | 149 ± 2.66 |  | 38 | 160 ± 3.45 | 105 | 162 ± 2.09 |
|  NDF | 15 | 369 ± 33.6 | 70 | 389 ± 11.2 |  | 33 | 358 ± 12.9 | 90 | 336 ± 7.63 |
|  Starch  | 7 | 248 ± 83.0 | 35 | 312 ± 32.5 |  | 13 | 307 ± 38.4 | 31 | 287 ± 25.4 |
|  Total FA  | 16 | 28.1 ± 3.42 | 91 | 46.1 ± 2.43 |  | 43 | 24.1 ± 1.39 | 131 | 61.6 ± 1.4 |
| FA intake (g/kg of DMI) |  |  |  |  |  |  |  |  |  |
| C14:0 | 11 | 0.1 ± 0.04 | 53 | 0.2 ± 0.03 |  |  | 0.1 ± 0.02 | 88 | 0.8 ± 0.14 |
| C16:0 | 19 | 4.5 ± 0.47 | 83 | 6.9 ± 0.30 |  |  | 4.6 ± 0.27 | 120 | 12.2 ± 0.64 |
| C18:0 | 19 | 1.0 ± 0.12 | 93 | 1.4 ± 0.09 |  |  | 0.9 ± 0.14 | 119 | 6.1 ± 0.69 |
|  c9-C16:1 | 9 | 0.1 ± 0.02 | 37 | 0.4 ± 0.08 |  | 23 | 0.2 ± 0.02 | 77 | 0.7 ± 0.08 |
|  c9-C18:1 | 8 | 5.9 ± 1.84 | 29 | 14.9 ± 2.05 |  | 20 | 4.1 ± 0.40 | 61 | 14.9 ± 1.14 |
|  c9c12-C18:2 | 8 | 12.2 ± 3.60 | 30 | 19.1 ± 1.76 |  | 24 | 9.1 ± 0.87 | 65 | 17.2 ± 1.37 |
|  c9c12c15-C18:3 | 10 | 5.8 ± 2.46 | 36 | 10.7 ± 1.73 |  | 21 | 2.7 ± 0.34 | 59 | 7.2 ± 0.85 |
| Duodenal flows (g/kg of DMI) |  |  |  |  |  |  |  |  |  |
| Total FA | 18 | 32.7 ± 18.4 | 84 | 46.7 ± 20.8 |  | 33 | 28.4 ± 9.45 | 103 | 60.0 ± 21.4 |
| C14:0 | 9 | 0.5 ± 0.13 | 51 | 0.4 ± 0.03 |  | 23 | 0.4 ± 0.04 | 63 | 0.9 ± 0.14 |
| C16:0 | 18 | 5.4 ± 0.62 | 85 | 6.6 ± 0.29 |  | 37 | 5.5 ± 0.39 | 103 | 11.9 ± 0.62 |
| C18:0 | 19 | 17.2 ± 2.28 | 93 | 26.1 ± 1.50 |  | 38 | 14.9 ± 1.03 | 110 | 29.5 ± 1.20 |
|  c9-C16:1 | 8 | 0.2 ± 0.04 | 31 | 0.3 ± 0.04 |  | 18 | 0.2 ± 0.02 | 58 | 0.3 ± 0.02 |
| c9-C18:1 | 7 | 2.2 ± 0.87 | 36 | 3.9 ± 0.72 |  | 14 | 2.2 ± 0.29 | 40 | 6.1 ± 0.93 |
| c9c12-C18:2 | 8 | 1.5 ± 0.42 | 37 | 2.5 ± 0.48 |  | 16 | 1.6 ± 0.21 | 40 | 2.1 ± 0.22 |
| c9c12c15-C18:3 | 9 | 0.4 ± 0.08 | 34 | 0.6 ± 0.09 |  | 15 | 0.3 ± 0.04 | 38 | 0.6 ± 0.08 |
| dMO, % | 9 | 73.8 ± 2.35 | 52 | 73.3 ± 1.05 |  | 32 | 72.3 ± 0.97 | 83 | 72.0 ± 0.62 |
| Rumen pH | 10 | 6.2 ± 0.08 | 46 | 6.2 ± 0.04 |  | 31 | 6.2 ± 0.04 | 85 | 6.2 ± 0.03 |
| Acetate/propionate ratio | 10 | 3.1 ± 0.28 | 55 | 3.0 ± 0.11 |  | 36 | 3.1 ± 0.14 | 97 | 2.8 ± 0.07 |

1 LS = lipid supplement.

2 DMI = DM intake.

Ntrt = number of treatments

**Supplementary Table S5** *Description of the Fish subset with intake level, percentage of concentrate, diet chemical composition, duodenal fatty acid (****FA****) flows and digestive parameters (ruminal pH, digestible organic matter (****dMO****), and acetate/propionate ratio) from diets without (DLS0) or with fish (DLSfish) or another lipid supplement (DLSother)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | Fish subset |  |  |
|  | DLS0 |  | DLSother |  | DLSfish |
|  | Ntrt | mean ± s.e. |  | Ntrt | mean ± s.e. |  | Ntrt | mean ± s.e. |
| Intake level, % BW | 9 | 2.7 ± 0.29 |  | 26 | 2.4 ± 0.11 |  | 42 | 2.3 ± 0.09 |
| Percentage of concentrate, % | 9 | 44.8 ± 2.79 |  | 26 | 49.5 ± 3.54 |  | 42 | 50.5 ± 2.73 |
| Intake (g/kg of DMI1) |  |  |  |  |  |  |  |  |
|  Crude protein | 4 | 184 ± 8.44 |  | 16 | 167 ± 5.49 |  | 27 | 169 ± 5.00 |
|  NDF | 3 | 354 ± 47.0 |  | 14 | 388 ± 16.7 |  | 23 | 367 ± 13.6 |
|  Starch | 2 | 318 ± 96.0 |  | 5 | 216 ± 49.9 |  | 8 | 269 ± 34.7 |
|  Total fatty acids | 8 | 27.2 ± 4.41 |  | 24 | 52.7 ± 2.67 |  | 39 | 47.9 ± 2.21 |
| FA intake (g/kg of DMI) |  |  |  |  |  |  |  |  |
| C14:0 | 5 | 0.10 ± 0.03 |  | 22 | 0.4 ± 0.06 |  | 34 | 1.7 ± 0.27 |
| C16:0 | 7 | 4.85 ± 0.69 |  | 24 | 10.3 ± 1.20 |  | 37 | 8.6 ± 0.57 |
| C18:0 | 8 | 0.9 ± 0.35 |  | 23 | 5.8 ± 2.31 |  | 39 | 2.2 ± 0.51 |
|  c9-C16:1 | 5 | 0.1 ± 0.03 |  | 20 | 0.3 ± 0.08 |  | 30 | 1.5 ± 0.18 |
|  c9-C18:1 | 5 | 8.2 ± 0.69 |  | 34 | 6.2 ± 1.67 |  | 22 | 10.2 ± 1.23 |
|  c9c12-C18:2 | 6 | 10.6 ± 2.44 |  | 23 | 13.3 ± 1.91 |  | 35 | 11.5 ± 1.06 |
|  c9c12c15-C18:3 | 6 | 5.2 ± 1.23 |  | 23 | 10.2 ± 1.92 |  | 35 | 6.3 ± 0.83 |
|  EPA2 | 6 | 0.01 ± 0.01 |  | 21 | 0.03 ± 0.01 |  | 36 | 2.1 ± 0.28 |
|  DPA3 | 5 | 0 ± 0 |  | 8 | 0.02 ± 0.01 |  | 26 | 0.3 ± 0.08 |
|  DHA4 | 6 | 0.005 ± 0.003 |  | 21 | 0.01 ± 0.01 |  | 36 | 2.0 ± 0.41 |
|  LCFA5 | 5 | 0.02 ± 0.01 |  | 8 | 0.07 ± 0.05 |  | 26 | 3.9 ± 0.72 |
| Duodenal flows (g/kg of DMI) |  |  |  |  |  |  |  |  |
| Total FA  | 6 | 32.6 ± 20.1 |  | 24 | 52.6 ± 14.2 |  | 35 | 49.5 ± 15.3 |
| C14:0 | 3 | 0.3 ± 0.16 |  | 15 | 0.5 ± 0.07 |  | 24 | 1.2 ± 0.30 |
| C16:0 | 6 | 5.3 ± 1.30 |  | 18 | 10.4 ± 1.36 |  | 34 | 9.5 ± 0.60 |
| C18:0 | 7 | 17.3 ± 3.46 |  | 18 | 21.8 ± 1.77 |  | 36 | 13.8 ± 1.66 |
|  c9-C16:1 | 4 | 0.2 ± 0.08 |  | 14 | 0.1 ± 0.02 |  | 26 | 0.7 ± 0.09 |
| c9-C18:1 | 0 |  |  | 15 | 2.6 ± 0.21 |  | 22 | 2.5 ± 0.17 |
| c9c12-C18:2 | 3 | 2.1 ± 0.42 |  | 17 | 1.6 ± 0.25 |  | 28 | 1.6 ± 0.19 |
| c9c12c15-C18:3 | 3 | 0.4 ± 0.11 |  | 17 | 0.9 ± 0.14 |  | 28 | 0.5 ± 0.07 |
| EPA | 4 | 0.04 ± 0.02 |  | 14 | 0.05 ± 0.02 |  | 33 | 0.2 ± 0.03 |
| DPA | 5 | 0.01 ± 0.001 |  | 8 | 0.04 ± 0.01 |  | 29 | 0.2 ± 0.09 |
| DHA | 4 | 0.03 ± 0.02 |  | 14 | 0.02 ± 0.01 |  | 33 | 0.4 ± 0.16 |
| LCFA5 | 4 | 0.09 ± 0.04 |  | 8 | 0.1 ± 0.04 |  | 29 | 0.8 ± 0.29 |
| dMO, % | 3 | 72.5 ± 1.54 |  | 8 | 71.0 ± 1.97 |  | 14 | 72.5 ± 1.34 |
| Rumen pH | 4 | 6.3 ± 0.19 |  | 16 | 6.3 ± 0.08 |  | 28 | 6.4 ± 0.05 |
| acetate/propionate Ratio | 4 | 3.3 ± 0.41 |  | 16 | 3.1 ± 0.13 |  | 25 | 2.9 ± 0.11 |

1 DMI = DM intake.

2 EPA = eicosapentanoic acid (C20:5n-3).

3 DPA = docosapentanoic acid (C22:5n-3).

 4 DHA = docosahexanoic acid (C22:6n-3).

 5 LCFA = sum of EPA + DPA +DHA

Ntrt = number of treatments

**Supplementary Table S6** *Correlations among duodenal flows of selected odd- and branched-chain fatty acids (****OBCFA****) and dietary data1 or digestive parameters2 from forage diets and diets supplemented with seeds, vegetable oils or animal fats in ovine and bovine species*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Duodenal flow (g/kg DMI)3 | Subset | Intake level | DMI | CP | NDF | Starch | PCO | FAint | A/P | OMDr | MCPS | EMPS | RPB | Ruminal pH |
| C15:0 | Forage | 0.480 (0.011) |  | 0.503 (0.015) |  | - | - | 0.686 (0.001) | 0.816 (0.025) |  | -0.380 (0.051) |  | 0.145 (0.031) | 0.802 (0.030) |
|  | Seed/Oil/fat |  | -0.289 (0.011) |  |  |  |  |  | -0.483 (0.001) | 0.277 (0.015) |  | -0.379 (0.001) |  | 0.369 (0.021) |
| Iso-C15:0 | Forage | 0.510 (0.013) |  |  |  | - | - | 0.694 (0.001) |  |  |  |  |  |  |
|  | Seed/Oil/fat |  |  | 0.558 (0.001) |  |  |  |  | -0.754 (0.001) | 0.508 (0.001) | 0.410 (0.011) | -0.524 (0.001) | 0.400 (0.013) |  |
| Anteiso-C15:0 | Forage |  | 0.568 (0.009) |  |  | - | - | 0.708 (0.001) |  |  |  |  |  |  |
|  | Seed/Oil/fat |  |  | 0.562 (0.001) |  |  |  |  | -0.765 (0.001) | 0.325 (0.036) | 0.326 (0.035) | -0.314 (0.043) |  |  |
| Iso-C16:0 | Forage |  |  |  |  | - | - |  |  |  |  |  |  |  |
|  | Seed/Oil/fat |  |  | 0.700 (0.001) | -0.473 (0.030) |  |  |  |  |  |  |  |  |  |
| C17:0 | Forage | 0.556 (0.005) | -0.841 (0.002) | 0.480 (0.024) |  | - | - | 0.700 (0.001) |  |  |  | -0.441 (0.031) |  |  |
|  | Seed/Oil/fat |  | -0.231 (0.033) |  | -0.564 (0.001) | 0.562 (0.001) | 0.481 (0.001) | 0.395 (0.001) | -0.504 (0.001) | 0.219 (0.044) | 0.310 (0.004) |  |  | -0.379 (0.003) |
| Iso-C17:0 | Forage | -0.841 (0.002) | -0.841 (0.002) | -0.944 (0.001) | 0.975 (0.001) | - | - |  |  |  |  | 0.782 (0.008) | -0.751 (0.002) |  |
|  | Seed/Oil/fat |  |  |  |  |  | 0.402 (0.047) | 0.549 (0.010) |  | 0.413 (0.040) | 0.650 (0.001) |  |  |  |
| Anteiso-C17:0 | Forage | -0.780 (0.008) | -0.780 (0.008) | -0.968 (0.001) | 0.980 (0.001) | - | - |  |  |  |  | 0.760 (0.011) | -0.741 (0.014) |  |
|  | Seed/Oil/fat | -0.718 (0.001) | -0.634 (0.001) |  |  |  | 0.429 (0.023) |  |  | 0.667 (0.001) | 0.626 (0.001) | -0.648 (0.001) | 0.522 (0.004) |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

1 DMI = dry matter intake; PCO = percentage of concentrate; FAint = total fatty acid intake.

2 A/P = acetate/propionate ratio; OMDr = organic matter truly digested in the rumen; MCPS = microbial crude protein synthesis; EMPS = efficiency of microbial protein synthesis; RPB = rumen protein balance.

3 Coefficient of correlation and significance of probability in brackets.

**Supplementary Table S7** *Correlations among duodenal flows of selected cis and trans isomers of C18:1 and C18:2, and C18:3n-3 and dietary data1 or digestive parameters2 from diets supplemented with seeds, vegetable oils or animal fats in ovine and bovine species*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Duodenal Flows3 (g/kg DMI) | Subset | Intake level | NDF | Starch | PCO | FAint | A/P | EPMS | RPB | ruminal pH |
| c9-C18:1 | Seed | -0.458 (0.006) |  | 0.823 (0.000) | 0.612 (0.000) | 0.587 (0.001) | -0.682 (0.015) |  |  | -0.697 (0.004) |
| c9-C18:1 | Oil/fat |  |  | 0.766 (0.001) |  | 0.653 (0.000) | -0.441 (0.002) |  |  |  |
| c11-C18:1 | Seed | -0.379 (0.047) | -0.810 (0.000) |  | 0.636 (0.000) | 0.498 (0.011) |  |  | -0.403 (0.033) | -0.840 (0.009) |
| c11-C18:1 | Oil/fat |  | -0.565 (0.000) |  | 0.695 (0.000) |  |  |  |  |  |
| c15-C18:1 | Seed/oil/fat |  |  |  |  | 0.756 (0.000) | -0.525 (0.003) |  | 0.289 (0.036) | 0.444 (0.039) |
| t9-C18:1 | Seed/oil/fat |  | -0.475 (0.000) |  | 0.525 (0.000) | 0.831 (0.000) | -0.351 (0.017) |  |  |  |
| t10-C18:1 | Seed |  |  |  |  | 0.702 (0.001) | -0.740 (0.036) |  |  |  |
| t10-C18:1 | Oil/fat |  |  |  |  | 0.553 (0.050) |  |  |  |  |
| t11-C18:1 | Seed/oil/fat | -0.258 (0.006) |  | 0.636 (0.000) |  | 0.604 (0.000) | -0.349 (0.005) |  | -0.217 (0.022) |  |
| t13+14-C18:1 | Seed |  |  |  |  | 0.969 (0.000) |  |  |  |  |
| t13+14-C18:1 | Oil/fat | 0.503 (0.047) |  |  |  | 0.734 (0.007) |  |  |  |  |
| t15-C18:1 | Seed/oil/fat |  | -0.544 (0.001) |  | 0.558 (0.000) | 0.913 (0.000) | -0.489 (0.004) |  |  |  |
| t10c12-CLA4 | Seed/oil/fat | -0.327 (0.003) | -0.312 (0.010) | 0.644 (0.000) | 0.334 (0.002) | 0.695 (0.000) | -0.609 (0.000) |  |  |  |
| c9t11-CLA | Oil/fat |  |  | 0.683 (0.004) |  |  |  |  |  |  |
| t11c15-C18:2 | Seed/oil/fat |  |  |  | 0.455 (0.002) |  | -0.641 (0.002) |  |  |  |
| c9c12-C18:2 | Seed/oil/fat |  | -0.657 (0.000) | 0.851 (0.000) | 0.713 (0.000) |  | -0.774 (0.000) | 0.196 (0.025) | -0.185 (0.034) | -0.443 (0.000) |
| c9c12c15-C18:3 | Seed | 0.516 (0.001) |  | -0.573 (0.013) |  |  |  |  |  |  |
| c9c12c15-C18:3 | Oil/fat |  |  |  |  |  |  | -0.342 (0.006) |  |  |

1 PCO = percentage of concentrate; FAint = total fatty acid intake;

2 A/P = acetate/propionate ratio; EMPS = efficiency of microbial protein synthesis; RPB = rumen protein balance.

3 Coefficient of correlation and significance of probability in brackets.

4 CLA = conjugated linoleic acid.

**Supplementary Table S8** *Evaluation of the models using the mean square predicted error and the coefficient regression between observed (Yo) and predicted (Xp) duodenal flows*

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dependent variable (Y) | Independent variable (X, g/kg DMI1) | Subset | Ntrt2 | MSPE3(g/kg DMI) | ECT4 | ER5 | ED6 | Intercept (ß0) | Coefficient (ß1) | RMSE | R² |
| Total FAo | total FAp | Seed/Oil/fat | 147 | 62.64 | 0.1 | 0.1 | 99.9 |  | 0.99 ± 0.04 | 7.96 | 0.77 |
| c9-C18:1o | c9-C18:1p | Seed | 108 | 2.78 | 17.7 | 5.3 | 77.0 |  | 1.20 ± 0.08 | 1.48 | 0.70 |
| c9-C18:19o | c9-C18:1p | Oil/fat | 75 | 0.59 | 6.7 | 3.4 | 90.0 |  | 0.88 ± 0.07 | 0.74 | 0.67 |
| Total C18:2o | total C18:2p | Seed/Oil/fat | 121 | 1.453 | 2.5 | 1.7 | 95.8 |  | 0.80 ± 0.14 | 1.19 | 0.22 |
| c9c12-C18:2o | c9c12-C18:2p | Seed/Oil/fat | 76 | 0.60 | 4.0 | 0.6 | 95.4 |  | 1.10 ± 0.15 | 0.76 | 0.41 |
| Total C18:3o | total C18:3p | Seed | 238 | 0.079 | 2.5 | 1.7 | 95.8 |  | 0.80 ± 0.06 | 0.26 | 0.42 |
| Total C18:3o | total C18:3p | Oil/fat | 234 | 0.079 | 0 | 6.9 | 93.1 |  | 1.31 ± 0.07 | 0.27 | 0.57 |
| c9c12c15-C18:3o | c9c12c15-C18:3p | Seed | 114 | 0.100 | 23.4 | 4.6 | 72.0 |  | 0.82 ± 0.07 | 0.27 | 0.57 |
| c9c12c15-C18:3o | c9c12c15-C18:3p | Oil/fat | 94 | 0.070 | 1.2 | 7.0 | 91.8 |  | 1.29 ± 0.11 | 0.26 | 0.60 |
| c15-C18:1o | C18:3p | Seed/Oil/fat | 26 | 0.018 | 25.4 | 55.6 | 19.0 | 0.06 ± 0.02 | 0.44 ± 0.07 | 0.06 | 0.63 |
| t9-C18:1o | total C18:1p | Seed/Oil/fat | 44 | 0.020 | 38.4 | 0.3 | 61.3 | 0.1 ± 0.05 | 0.88 ± 0.27 | 0.12 | 0.19 |
| t13+t14-C18:1 o | total C18:3p | Seed | 25 | 0.2598 | 0.12 | 0.07 | 0.80 | 0.3 ± 0.13 | 0.80 ± 0.14 | 0.48 | 0.59 |
| t13+t14-C18:1 o | total C18:3p | Oil/fat | 28 | 0.3221 | 0.41 | 0.03 | 0.56 | 0.3 ± 0.11 | 1.15 ± 0.12 | 0.44 | 0.76 |
| t10c12-CLA7o | total C18:2p² | Seed/Oil/fat | 32 | 0.0006 | 0.5 | 9.1 | 90.4 |  | 0.69 ± 0.18 | 0.02 | 0.32 |
| t11t13-CLAo | total C18:3p | Seed/Oil/fat | 19 | 0.002 | 15.0 | 65.0 | 20.0 | -0.01 ± 0.006 | 1.84 ± 0.16 | 0.02 | 0.79 |

1 DMI = DM intake.

2 Ntrt = number of treatments.

3 MSPE = means square predicted error.

4 ECT = errors in central tendency.

5 ER = errors due to regression.

6 ED = errors due to disturbance

7 CLA = conjugated linoleic acid.

FA = fatty acids

**Supplementary Material S1** List of references from AGRum database used for the meta-analysis

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