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| **Supplementary material 1** *Components of the total mixed ration fed to the cows during rumen incubations* | |
| Ingredient | g/kg DM |
| Maize silage | 237 |
| Grass silage | 396 |
| Grass hay/wheat straw | 13 |
| Soybean meal | 47 |
| Sweet beet syrup | 10 |
| Wet distillers grains with solubles | 84 |
| Soybean meal (rumen protected) | 19 |
| Vitamin and minerals premix1 | 11 |
| Concentrate2 | 183 |
| 1 Contained: calcium 175 g/kg; phosphorous 0.2 g/kg; magnesium 130 g/kg; sodium 50 g/kg; chloride 78 g/kg; vitamin A 600,000 IE/kg; vitamin D 120,000 IE/kg; vitamin E 8,000 IE/kg.  2 Contained (%): maize, 30; palm kernel, 22; rapeseed solvent extract, 21.3; citrus pulp, 10; soybean meal (rumen protected), 5; beet molasses, 5; molasses, 2; wheat, 2; chalk (CaO), 0.6; urea, 0.6; salt, 0.5; magnesium oxide (80% MgO), 0.5; palm oil, 0.2; vitamin and minerals premix, 0.3. | |

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| **Supplementary material 2** *Variation in the fractional degradation rate (kd) of dry matter (DM), organic matter (OM), crude protein (CP), neutral detergent fiber (aNDFom)1 and starch of two reference samples (SS and SR)1 in five series* | | | | | |
|  | *k*d (h-1) | | | | |
| DM | OM | CP | aNDFom | Starch |
| SR |  |  |  |  |  |
| Series 1 | 0.039 | 0.038 | 0.038 | 0.024 | 0.133 |
| Series 2 | 0.032 | 0.033 | 0.035 | 0.019 | 0.153 |
| Series 3 | 0.034 | 0.034 | 0.040 | 0.021 | 0.125 |
| Series 4 | 0.038 | 0.039 | 0.031 | 0.022 | 0.142 |
| Series 5 | 0.039 | 0.039 | 0.032 | 0.017 | 0.135 |
| SEM1 | 0.001 | 0.001 | 0.002 | 0.001 | 0.005 |
|  |  |  |  |  |  |
| SS |  |  |  |  |  |
| Series 1 | 0.032 | 0.032 | 0.036 | 0.020 | 0.117 |
| Series 2 | 0.035 | 0.035 | 0.028 | 0.024 | 0.152 |
| Series 3 | 0.036 | 0.034 | 0.030 | 0.024 | 0.146 |
| Series 4 | 0.047 | 0.047 | 0.029 | 0.023 | 0.157 |
| Series 5 | 0.039 | 0.039 | 0.031 | 0.024 | 0.124 |
| SEM | 0.003 | 0.003 | 0.001 | 0.001 | 0.008 |
| 1 The SR and SS were incubated in the rumen of three cows along with the maize silage samples to check the variation between the series. | | | | | |  |  |  | 0.001 |

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| **Supplementary material 3** *Correlation matrix for chemical parameters and washout fraction1 (W), potentially rumen degradable fraction2 (D), rumen undegradable fraction (U), degradation rate (kd) and effective rumen degradation3 (ED) of dry matter (DM), organic matter (OM), crude protein (CP), starch and neutral detergent fiber (aNDFom4) of maize silages (n=75)* | | | | | | | | | |
| *In situ* parameter | Chemical Parameters | | | | | | | | |
| DM | Ash | CP | Crude fat | Sugar | Starch | aNDFom | Acid detergent fibre (ADFom5) | Lignin (sa)6 |
| DM |  |  |  |  |  |  |  |  |  |
| *W*DM | **-0.48a** | ns | **0.36a** | 0.28b | ns | **-0.48a** | ns | **0.31a** | ns |
| *U*DM | **-0.33a** | 0.28b | -0.27b | ns | **0.30a** | **-0.31a** | **0.51a** | **0.63a** | **0.44a** |
| *D*DM | **0.48a** | ns | ns | -0.26b | ns | **0.50a** | ns | **-0.49a** | **-0.32a** |
| *k*d-DM | ns | ns | ns | -0.27b | ns | **0.46a** | -0.27b | **0.39a** | ns |
| EDDM | -0.23b | ns | **0.32a** | ns | ns | ns | -0.26b | ns | ns |
| OM | |  |  |  |  |  |  |  |  |
| *W*OM | **-0.45a** | ns | 0.29b | 0.27b | ns | **-0.44a** | ns | **0.32a** | ns |
| *U*OM | **-0.37a** | ns | ns | ns | -0.28b | **-0.51a** | **0.53a** | **0.68a** | **0.53a** |
| *D*OM | **0.51a** | ns | ns | **-0.31a** | ns | **0.54a** | ns | **-0.49a** | **-0.34a** |
| *k*d-OM | ns | ns | ns | ns | ns | **0.41a** | **-0.35a** | **-0.47a** | ns |
| EDOM | -0.27b | ns | ns | ns | ns | -0.03b | **-0.31a** | ns | ns |
| CP |  |  |  |  |  |  |  |  |  |
| *W*CP | **-0.32a** | ns | ns | **0.31a** | ns | **-0.40a** | ns | **0.35a** | ns |
| *U*CP | ns | ns | -0.28b | ns | ns | ns | 0.25b | ns | ns |
| *D*CP | **0.31a** | ns | ns | ns | ns | **0.33a** | ns | **-0.33a** | ns |
| *k*d-CP | ns | ns | ns | ns | ns | 0.29b | ns | **-0.44a** | ns |
| EDCP | -**0.35a** | ns | ns | ns | ns | -0.26b | ns | ns | ns |
| Starch |  |  |  |  |  |  |  |  |  |
| *W*starch | **-0.51a** | ns | ns | ns | ns | **-0.53a** | 0.30b | **0.55a** | 0.36b |
| *U*starch | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| *D*starch | **0.42a** | ns | ns | ns | ns | **0.48a** | ns | **-0.50a** | **-0.34a** |
| *k*d-starch | ns | ns | ns | ns | ns | ns | ns | 0.23b | ns |
| EDstarch | **-0.51a** | ns | ns | ns | ns | **-0.48a** | 0.30b | **0.55a** | 0.30b |
| aNDFom | |  |  |  |  |  |  |  |  |
| *U*aNDFom | ns | ns | ns | ns | -0.23b | -0.28b | ns | **0.36a** | **0.38a** |
| *D*aNDFom | ns | ns | ns | **-0.30a** | ns | ns | ns | ns | **0.33a** |
| *k*d-aNDFom | ns | ns | ns | ns | ns | ns | ns | ns | ns |
| Lag time | ns | ns | ns | 0.24b | ns | ns | ns | ns | ns |
| EDaNDFom | ns | ns | ns | ns | ns | ns | ns | -0.24b | ns |
| a *P* < 0.01; b 0.01 > *P* < 0.05; ns,Non-significant.  1 The fraction disappeared by washing with tap water in a washing machine at 25°C for 40 min.  2 The *D* fraction was calculated as *D* = 1 - (*W* + *U*).  3 The EDDM and EDOM were calculated by using passage rate (*k*p) value of 0.05 h-1. The EDCP, EDstarch and EDaNDFom were calculated using *k*p values of 0.045, 0.06 and 0.020 h-1, respectively.  4 Neutral detergent fibre assayed with a heat stable amylase and expressed exclusive of residual ash.  5 Acid detergent fibre expressed exclusive of residual ash.  6 Lignin determined by solubilization of cellulose with sulphuric acid. | | | | | | | | | |