**Supplementary Materials:**

**Impact of animal density on cattle nutrition in dry Mediterranean rangelands: a faecal NIRS-aided study**

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**Table S1** Stocking dates and cow body weight values at turning in, calf weaning, and turning out dates, and calf average daily gain.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | T | n cows | Area (ha) | Date cows in | Date feeding started | Date cows out | Weaning date | Initial BW(kg) | Cow BW gain (kg) to weaning | BW gain (kg) from weaning to turn out | N calves | Calf ADG (kg/d) |
| 2013 |  |   |  |   |  |  |  |  |  |  |  |  |
|  | L | 33 | 59.3 | 20.1.13 | 20.6.13 | 5.11.13 | 7.05.13 | 444±12 | 51.1±9.3 | -29.7±8.9 | 27 | 999±44b |
|  | H | 51 | 48.8 | 20.1.13 | 20.6.13 | 1.09.13 | 7.05.13 | 421±11 | 43.9±5.2 | -15.3±6.4 | 42 | 877±40a |
| 2014 |  |   |  |   |  |   |  |   |   |   |  |  |
|  | L | 28 | 59.3 | 16.2.14 | 22.6.14 | 26.10.14 | 11.05.14 | 407±11 | 60.0±6.5 | -14.0±9.5 | 23 | 930±42 |
|  | H | 46 | 48.8 | 16.2.14 | 22.6.14 | 31.7.14 | 11.05.14 | 413±11 | 35.9±10.3 | -19.0±7.5 | 31 | 933±43 |
| 2015 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | L | 31 | 59.3 | 20.1.15 | 11.6.15 | 12.10.15 | 30.04.15 | 413±11 | 86.0±9.6a | 24±21.0 | 18 | 963±49a |
|  | H | 52 | 48.8 | 20.1.15 | 11.6.15 | 31.8.15 | 30.04.15 | 419±11 | 55.0±7.3b | 18.5±20.7 | 34 | 851±32b |

BW=body weight; ADG=Average Daily Gain

a,b Different superscripts for values indicate a statistically significant (P<0.05) difference within a year.

**Table S2** Performance of NIRS calibrations used for forage and poultry litter quality (on dry matter basis).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Constituent | n | Mean | SD | SEC | R2cal |  SEcv | R2cv |
| Forage |  |  |  |  |  |  |  |
| Ash, g/kg | 302 | 111 | 32 | 7.2 | 0.95 | 15 | 0.83 |
| NDF, g/kg | 328 | 592 | 108 | 17.1 | 0.97 | 22.3 | 0.96 |
| Protein, g/kg | 329 | 99 | 64 | 5.1 | 0.99 | 6.9 | 0.99 |
| % IVDMD1 | 188 | 63.2 | 15.3 | 2.61 | 0.97 | 3.69 | 0.94 |
| Poultry litter |  |  |  |  |  |  |  |
| Ash, g/kg | 98 | 114 | 43 | 8.3 | 0.96 | 9.8 | 0.95 |
| NDF, g/kg | 91 | 394 | 68 | 15.9 | 0.95 | 19.0 | 0.92 |
| Protein, g/kg | 106 | 198 | 69 | 5.7 | 0.99 | 6.6 | 0.99 |
| % IVDMD1 | 77 | 69.9 | 7.8 | 3.47 | 0.80 | 3.65 | 0.78 |

NIRS = Near InfraRed Spectroscopy; SD is the standard deviation of calibration set; SEC and SECV are the standard errors of calibration and cross-validation; R2cal and R2cv represent linearities of calibration and cross-validation, respectively; n is the number of scores used in the calibration.

1 IVDMD = In vitro Dry Matter Digestibility

**Table S3** Calibration performance of the faecal NIRS equations for faeces and dietary chemical composition (from Landau et al., 2015, at the exception of the calibration fpr proportion of poultry litter).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | N | Mean | SD | SEC | R2cal | SECV | R2CV |
| Faecal composition |  |  |  |  |  |  |  |
| Ash, g/kg | 159 | 223 | 52 | 12 | 0.94 | 13 | 0.94 |
| NDF, g/kg | 117 | 525 | 68 | 21 | 0.91 | 27 | 0.84 |
| Protein, g/kg | 132 | 121 | 26 | 5.0 | 0.96 | 6.0 | 0.95 |
| Dietary composition |  |  |  |  |  |  |  |
| Ash (g/kg DM) | 111 | 96 | 40 | 15 | 0.87 | 16 | 0.83 |
| CP (g/kg DM) | 118 | 103 | 30 | 10 | 0.89 | 13 | 0.81 |
| NDF (g/kg DM) | 111 | 500 | 106 | 35 | 0.89 | 39 | 0.86 |
| IVDMD(% of DM)1 | 109 | 64.5 | 93 | 2.8 | 0.91 | 3.1 | 0.89 |
|  |  |  |  |  |  |  |  |
| Proportion of Poultry litter (g/kg) | 64 | 10.2 | 18.6 | 5.2 | 0.92 | 7.7 | 0.83 |

NIRS = Near InfraRed Spectroscopy; SD is the standard deviation of calibration set; SEC and SECV are the standard errors of calibration and cross-validation; R2cal and R2cv represent linearities of calibration and cross-validation, respectively; N is the number of scores used in the calibration.

1 IVDMD = In vitro Dry Matter Digestibility

|  |  |
| --- | --- |
| Cumulative rainfall (mm) |  |
|  | Date |

**Figure S1** Yearly cumulative rainfall (mm) at the Kare-Deshe farm during the three years of experiment.

**Figure S2** Standing biomass in plots under L (grey; 0.56 cows/ha) and H (black; 1.11 cows/ha) treatments. Points (averages and standard errors) represent green (circles) and dry pasture seasons before (squares) and after (triangles) poultry litter supplementation was initiated.

|  |  |
| --- | --- |
| IVDMDherb (%) |  |
| IVDMDdiet (%) |  |

**Figure S3** In vitro digestibility of: (a) sampled herbage (IVDMDherb) and (b) faecal NIRS-predicted diet (IVDMDdiet). Animal density treatments were L (grey; 0.56 cows/ha) and H (black; 1.11 cows/ha). Points (averages and standard errors) represent green (circles) and dry pasture seasons before (squares) and after (triangles) poultry litter supplementation was initiated.