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Supplementary material

Variation of lupin protein degradation in ruminants studied *in situ* and using chemical protein fractions

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Supplementary Table S1 Ruminal in situ CP degradation parameters and ED (rumen outflow = 8%/h) estimated for the 15 untreated lupins.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Species | a1 | b1 | a+b1 | c1 | ED2 |
|  |  | (%) | (%) | (%) | (%/h) | (%) |
| Probor\_a | *L. angustifolius* | 29.0 | 70.1 | 99.1 | 16.5 | 76.2 |
| Probor\_b | *L. angustifolius* | 22.5 | 77.1 | 99.6 | 17.3 | 75.1 |
| Probor\_c | *L. angustifolius* | 25.5 | 74.5 | 100.0 | 16.4 | 75.5 |
| Boregine\_a | *L. angustifolius* | 40.7 | 59.2 | 100.0 | 14.9 | 79.2 |
| Boregine\_b | *L. angustifolius* | 43.6 | 55.6 | 99.2 | 19.6 | 83.0 |
| Boregine\_c | *L. angustifolius* | 22.8 | 77.0 | 99.8 | 16.9 | 75.1 |
| Boruta\_a | *L. angustifolius* | 36.7 | 63.2 | 100.0 | 14.9 | 77.7 |
| Boruta\_b | *L. angustifolius* | 16.4 | 83.7 | 100.0 | 12.6 | 67.3 |
| Boruta\_c | *L. angustifolius* | 27.9 | 71.9 | 99.8 | 15.7 | 75.5 |
| Regent | *L. angustifolius* | 28.0 | 71.7 | 99.7 | 18.4 | 78.0 |
| Idefix | *L. angustifolius* | 24.3 | 75.7 | 100.0 | 15.4 | 74.0 |
| Borlu | *L. angustifolius* | 40.2 | 59.5 | 99.7 | 17.8 | 81.1 |
| Mirabor | *L. angustifolius* | 18.6 | 80.6 | 99.2 | 21.0 | 76.9 |
| Amiga | *L. albus* | 33.4 | 66.6 | 100.0 | 15.3 | 77.2 |
| Bornal | *L. luteus* | 29.3 | 70.7 | 100.0 | 16.8 | 77.2 |

n = 3 cows per sample

ED = Effective degradation for a ruminal outflow (k) of 8%/h; a = instantly disappearing; b = potentially degradable; a+b = Plateau, maximal degradation; c = degradation rate.

1 From equation Degradation (%)=a+b∙(1-e-c∙0.01∙t).

2 From equation ED=a+[(b∙c)/(c+k)] with k = 8%/h.

Supplementary Table S2 Protein fractions and ruminal EDCNCPS (rumen outflow = 8%/h) calculated according to CNCPS for the 15 untreated lupins.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Chemical protein fractions (% of CP)1 | | | | | EDCNCPS2 |
|  | A | B1 | B2 | B3 | C | (%) |
| Probor\_a | 3.4 | 80.5 | 15.0 | 0.2 | 0.9 | 89.2 |
| Probor\_b | 2.6 | 78.0 | 17.7 | 0.4 | 1.3 | 87.5 |
| Probor\_c | 8.2 | 72.7 | 17.8 | 0.4 | 0.9 | 88.0 |
| Boregine\_a | 1.8 | 78.2 | 18.5 | 0.5 | 1.0 | 87.3 |
| Boregine\_b | 2.8 | 74.9 | 20.9 | 0.2 | 1.2 | 86.5 |
| Boregine\_c | 3.2 | 71.3 | 23.4 | 0.0 | 2.1 | 83.7 |
| Boruta\_a | 6.1 | 72.1 | 20.3 | 0.3 | 1.2 | 86.6 |
| Boruta\_b | 1.2 | 78.5 | 18.8 | 0.2 | 1.3 | 87.1 |
| Boruta\_c | 2.6 | 61.8 | 33.6 | 0.0 | 2.0 | 79.8 |
| Regent | 3.9 | 64.0 | 29.9 | 0.0 | 2.2 | 81.1 |
| Idefix | 1.3 | 77.3 | 19.8 | 0.3 | 1.3 | 86.6 |
| Borlu | 1.2 | 76.4 | 20.9 | 0.2 | 1.3 | 86.3 |
| Mirabor | 0.9 | 75.0 | 22.5 | 0.2 | 1.4 | 85.5 |
| Amiga | 5.5 | 75.7 | 17.1 | 0.6 | 1.1 | 87.8 |
| Bornal | 4.3 | 74.6 | 19.1 | 0.8 | 1.2 | 86.7 |

ED =Effective degradation; CNCPS = Cornell Net Carbohydrate and Protein System.

1 according to Cornell Net Carbohydrate and Protein System; A = non-protein nitrogen; B1 = true protein rapidly degradable in the rumen; B2 = true protein with intermediate degradation rate in the rumen; B3 = true protein with slow degradation rate in the rumen, C = unavailable or cell-wall bound true protein.

2 Effective degradation for a ruminal outflow (k) of 8%/h calculated with degradation rates of 200 (B1), 10 (B2) and 0.2%/h (B3) as suggested by Fox *et al.* 2003 as EDCNCPS = A + B1 ∙ [(200) / (200 + 8)] + B2 ∙ [(10) / (10 + 8)] + B3 ∙ [(0.2) / (0.2 + 8)], with EDCNCPS, A, B1, B2 and B3 given in % of CP.