



Digestibility, nitrogen balance and energy metabolism in young male Shetland ponies as affected by carbohydrate source

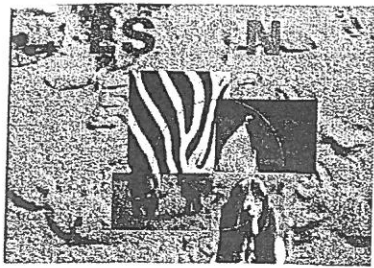
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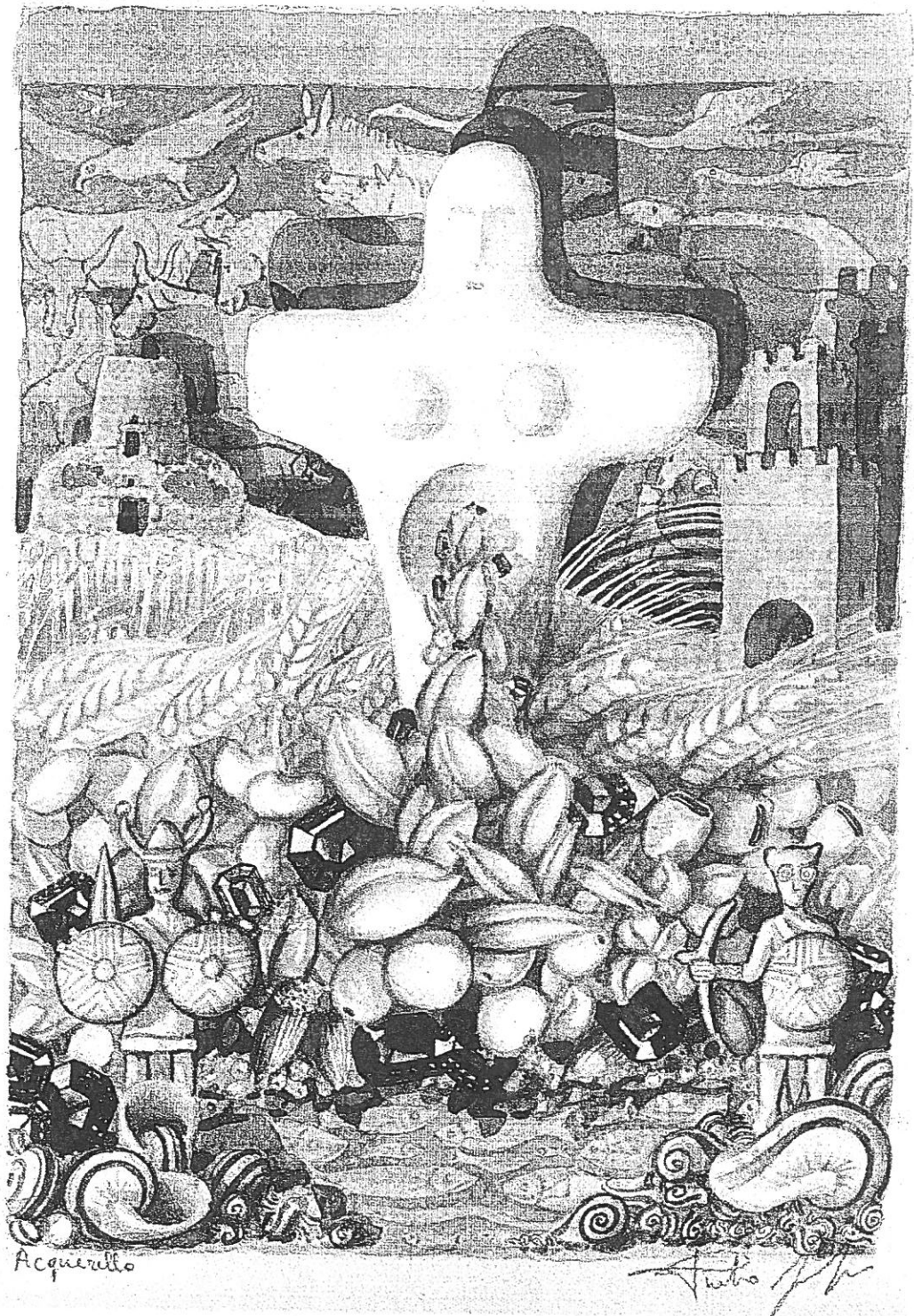
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Digestibility, nitrogen balance and energy metabolism in young male Shetland ponies as affected by carbohydrate source

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Introduction: The study objective was to investigate how four diets, namely a haylage (H), a H and oats (HO), a H and EquiGard (low glycaemic concentrate with a high content of soluble and insoluble fibres) (HEQ), and a H and Betfor (high content of sugar and soluble fibres) diet (HB), influenced daily feed intake, apparent digestibility, nitrogen and energy metabolism in Shetland ponies.

Materials and Methods: Four male Shetland ponies with an average body weight of 150 kg were used in a 4 x 4 Latin Square design. Quantitative urine and faeces collections (4 day periods) were carried out as well as gas exchange measurements (22 h) by means of indirect calorimetry.

Results and Discussion: Daily intake of crude protein (CP), starch and soluble non-starch polysaccharides (S-NSP) differed significantly between diets ($p = 0.02$, $p < 0.001$, $p < 0.001$, respectively). The apparent organic matter (OM), total non-starch polysaccharides (T-NSP) and dietary fibre (DF) digestibility were significantly different between dietary treatments ($p = 0.04$, $p = 0.02$, $p = 0.03$, respectively). There were tendencies for differences in apparent energy ($p = 0.09$) and starch ($p = 0.07$) digestibilities. The H diet, which contained the highest amount of DF, lignin and insoluble NSP (I-NSP) had the lowest apparent energy (52%), OM (54%), T-NSP (53%) and DF (60%) digestibility. When retained nitrogen was expressed in proportion to ingested N (7 – 24%), and heat production and retained energy (RE) in proportion to metabolizable energy (87 – 100% and 1 – 13%, respectively), no diet effects were recorded ($p = 0.4$). There was a tendency ($p = 0.08$) of diet effect on utilization of digested nitrogen for retention, with the HEQ diet having the highest value (43%). The HB diet caused some repartitioning of N between faeces and urine, faecal N being the highest and urinary N (UN) the lowest. Urinary N differed between diets ($p = 0.02$) with the HB diet being significantly lower (10.7) than the HO (12.2) and HEQ (12.6 g/day) diets. When UN was expressed in proportion to faecal N no treatment effect was recorded ($p = 0.2$). Energy lost in CH₄ was not affected by dietary treatment and only accounted for 1.3-3.8% of DE.

Conclusion: The inclusion of the three concentrates to a basal diet of haylage increased apparent OM, T-NSP and DF digestibility. Retained N also tended to be higher ($p = 0.06$) in the three concentrate diets. RE was not affected by type of diet, but ponies fed the H diet were found to be in negative energy balance (-35 kJ/d/kg BW^{0.75}) even though haylage was available *ad libitum*. Collectively, the results suggest that digestibility of T-NSP and DF as well as the utilization of N can be affected by the amount of S-NSP and I-NSP in the diet.