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O029

Prediction of nutrient digestibility and chemical composition of diets using near infrared spectroscopy (NIRS) of rabbit feces

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Near infrared spectroscopy (NIRS) has been reported to be a fast, reliable and economic tool to accurately predict different attributes of feeds. NIRS has been successfully used to monitor nutrition in ruminants through diet and/or feces, but few studies have tested this technology to predict rabbit diets digestibility. The aim of this study was to predict the nutrient digestibility of rabbit feeds and chemical composition of rabbit feeds and feces from NIRS analysis of feces. Sixty New Zealand White growing rabbits were randomly housed in single cages divided in five groups and fed different experimental diets. A total of 75 individual fresh feces samples from 15 rabbits (3 for each group) were collected every three days along the last fifteen days of the trial. The feces were dried (65 °C for 24 hours) and ground (1 mm screen diameter), then analyzed in reflectance mode in a scanning monochromator using a rectangular quartz cup. Spectral absorbance values were recorded as log1/R, where R is the sample reflectance, in the visible and near-infrared region (400-2500 nm), every 2 nm. Fecal spectral data were fitted to the digestibility coefficients and to the chemical composition of feces and fed diets. Modified Partial Least Squares equations were performed using five cross-validation groups to select the optimal number of factors and to avoid overfitting. Several derivative and scatter correction pre-treatments of spectral data were used. The standard error of cross-validation (SECV) and the coefficient of determination of cross validation (r^2CV) were used to select the better calibration equations. Good predictive performance was obtained for the prediction of CP, NFC and NDF digestibility (SECV = 0.007, 0.006, 0.020, respectively; r^2CV = 0.93, 0.75 and 0.74, respectively). The prediction of all the feed nutritional parameters (DM, M, CP, CF, EE, Ash, NFE, NDF, ADF, ADL, NFC) showed good predictive results (SECV from 0.009 for DM to 0.583 for NDF and r^2CV from 0.98 for DM to 0.83 for CP) and for most fecal components (OM, CP, Ash, NDF, ADF; SECV from 0.280 for DM to 0.883 for NDF; r^2CV from 0.95 for CP to 0.75 for NDF). This work supports the viability of NIRS analysis of feces as a fast and reliable analytical method which could allow important savings in rabbit digestibility trials testing the nutritional values of feeds. Future work should be done to definitely validate these models with external samples.

Acknowledgements

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O030

Performance and feeding behaviour of group–housed rabbits with free or time–limited access to feed

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The present study aimed at evaluating the effect of the feeding system (AL: *ad libitum vs.* R: time–based feed restriction) on performance, feeding behaviour and slaughter results in group–housed growing rabbits. A total of 288 crossbred rabbits of both sexes were housed in 18 pens (16 animals per pen), half fed *ad libitum* and half restricted during the first three weeks, and controlled from weaning to slaughter (33 to 75 d of age). At the beginning of the trial, R rabbits had access to feeder for 10 h a day; feeding time increased by 1 h every 3–4 d until 16 h/d in the first three weeks; then, feeding time increased by 1 h/d until 24–h access to feeders in the 4th week; thereafter, all animals were fed *ad libitum*. Rabbit feeding behaviour was controlled at 39, 46, 53 and 60 d of age by weighing the feeders every hour by an automatic weighing system. Individual data (live weight, carcass data) were analysed by PROC MIXED of SAS with the feeding system as fixed effect and the pen as a random effect; pen data (feed intake and conversion) were analysed by PROC GLM of SAS. During the whole trial, AL rabbits exhibited small and frequent meals during all the day with minimum intakes (about 2–3 g/h) in the morning (9:00 to 11:00 h) and maximum intakes (7–10 g/h) in the evening (19:00 to 21:00 h). R rabbits showed higher hourly feed consumption than AL

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rabbits, with peaks of 18, 15 and 14 g in the first hour after accessing feeder at 39, 46 and 53 d of age when the feeding time was 11, 13 and 16 h/d, respectively. Once fed freely, R rabbits took only two days to reach the same intake pattern of AL rabbits.

In the first three weeks, feed intake was lower (–5%, i.e. 128 *vs.* 122 g/d; $p<.01$) and feed conversion was better (–5%, i.e. 2.42 *vs.* 2.29; $p<.001$) in R rabbits compared to AL ones. In the following three weeks, R rabbits showed a worse feed conversion than AL rabbits (+ 5%, i.e. 2.70 *vs.* 2.83; $p<.001$). In the whole trial, the feeding system did not affect health status, growth performance, slaughter weight (on average 2860 g), dressing percentage (61.0%) and meat quality traits including pH, colour, thawing and coking losses and tenderness.

In conclusion, feeding behaviour was heavily affected by the restriction program, but rabbits returned quickly to a normal behaviour once fed freely. The time–restriction program in the first three weeks reduced feed intake level at 95% of *ad libitum* without compromising growth performance and slaughter results.

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O031

Effect of Chamomile (*Matricaria chamomilla*) on health in chickens

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The study was carried out in San Pedro, Cacha Parish, Riobamba Canton, Province of Chimborazo it is located at 3040 meters above sea level. The aim of this work was assess the effect of four levels of chamomile extract (LCE) in the health of Campero-INTA" line chickens, which is a chicken commercial line with 25% Cornish, 25% Red Rhode Island y 50% Ross. Chickens line under intensive production system; the chickens were allocated to four treatments (T1; T2; T3 and T4 (0, 2, 4 and 6% chamomile extract), in drinking water. These treatments had four repetitions under a completely randomized design for 55 days. In this case was use 60 animals to each treatments, a total of 240 chickens. The results were processed using SPSS (16.0.2) statistic software. By means of the separation of means through the Waller Duncan test at a significance level of $p<.05$ and $p<.01$. This study was conducted to determine the health status of the animals, used three microbiological analyzes of the feces of the poultry before, during and at the end of the investigation. To the start the analyzed the percentages of gram positive bacteria (GPB) were found same for T1 and T3 with 70% GPB, followed by T0 and T2 with 50% BGP; to final to the study was showed the highest value has T0 with 90% BGP, followed by T1 y T3 with 80 and 75% BGP. Regarding Gram Negative Bacteria (GNB) before applying the treatments was registered a value of 30% (GNB), during the investigation, the lowest values were the same for T0 and T2 with 50% BGN, as for the highest values reached for T1 and T3 with 70%, during the final phase of the investigation, they registered similar values for T2 and T3 with 10% BGN; followed by T1 with 20% and T0 with 25% BGN. The total coliforms found before application of the treatments was 400,000 CFU/g; once subjected to the extract of chamomile was observed for T0: 1060,000; T1: 770,000; T2: 440,000; And T3: 380,000 CFU/g; In the final cycle of the investigation lower values were found, registering for T0: 280,000; T1: 260,000; T2: 240,000: and T3: 240,000 UFC/ml. 2200 HPG (eggs per gram), followed by (T1) with 2850 HPG, then (T3) with 4400 HPG and a higher parasitic load with (T0) 17300 HPG were recorded in the coproparasite analysis. In conclusion the polyphenols influence the health of chikens, the treatment that had less CFU was T3, in terms of lower parasite load was obtained with T2 and T3 (240000 HPG).

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O032

Effect of chamomile (*Matricaria chamomilla*) on productive performance in chickens

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Chamomile extract (*Matricaria chamomilla)* has a high concentration of polyphenols. This plant improves the broilers productive performance and hens egg production. The present study was carried out in San Pedro Neighbourhood (3040 mamsl), Chimborazo Province, Ecuador. The aim of this work