EFFECT OF LEVEL OF FIBRE AND LEVEL OF GROUND OF FIBRE SOURCES ON DIGESTION AND ILEAL AND CAECAL CHARACTERIZATION OF MICROBIOTA OF EARLY WEANED RABBITS

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ABSTRACT

The aim of this work was to study at two different levels of fibre (LF) the effect of increase dietary particle size in diets for early-weaned rabbits. Four isonutritive diets arranged in a factorial design 2×2 including LF (30 vs 25% NDF) and type of ground of main sources of fibre, alfalfa hay and straw, (coarse–grounded at 9 mm vs normal–grounded at 1 mm) was used. Diets with 30% of NDF contained 19.5, 8.0, and 4.2% of alfalfa hay, cereal straw and lard, respectively. Diets with 25% NDF contained 11.6, 4.8 and 16.6% of alfalfa hay, cereal straw and wheat flour, respectively. The other ingredients were common to all diets (26% Wheat, 15% Wheat bran, 18% Sunflower meal and 4% Beet pulp). Diets included zinc-bacitracine and apramicine sulphate and an enzymatic complex constituted by amylase, xylanase and β-glucanase. Alfalfa was washed and the insoluble fraction was marked with Yb and included in a 0.5% in the diets in order to determine ileal digestibility. Particles larger than 0.3 mm and NDF larger than 0.3 mm decreased from 35.1 and 23.4% to 19.8 and 14.0% respectively, for coarse 30% NDF and normal 25% NDF diets, respectively. Particle size was determined by wet sieving. Two hundred rabbits weaned at 25 d were blocked by litter, caged individually and assigned randomly to the treatments. Diets were offered *ad libitum* from weaning to slaughter (55 d of age) and mortality was recorded. Eighty rabbits weaned at 25 d were used to determine faecal (from day 35 to 39) and ileal digestibilities. At 39 d of age, the animals were slaughtered and ileal digesta collected to determine ileal digestibility. Another 40 rabbits were slaughter at 39 d of age to collect the ileal and caecal digesta to charactize the microbiota by molecular techniques (Restriction Fragment Length Polymorphism). The reduction of LF increased mortality from 25 to 55 d of age (8 vs 17%, P=0.05), but no effect of type of ground was observed. The mortality was due to mucoid enteropathy. Low fibre diets showed higher digestibilities of DM and CP than diets with 30% NDF both at ileal (52.9 vs 60.0% and 72.4 vs 77.5%, respectively, P<0.01) and at faecal level (73.9 vs 67.1%, and 85.6 vs 82.3%, respectively, P<0.01). However, ileal and faecal digestibility of starch (96.8 and 100%, respectively) and faecal digestibilities of NDF and ADF were not affected by LF (32.9 and 22.0%, respectively). Coarse-grounded diets led to a reduction of NDF and ADF digestibilities (by 8.5 and 16.5%, respectively). Unlike to that observed in pigs and poultry, microbiota in rabbits showed higher biodiversity at the ileum than at the caecum (1743±192 (SEM) vs

623±109 number of sequences recognised in the data base, SSU_Unal.gb (Ribosomal Database Project, respectively). The degree of similarity between ceacal and ileal microbiota was of 65%. High fibre and coarse-grounded diets showed a reduction (P<0.05) of ileal biodiversity (31 and 40%, respectively). Within identified bacteria, coarse-grounded diets reduced in the ileum the presence of genera like Escherichia, Helicobacter or Klebsiella. Caecal microbiota showed higher stability among diets than at the ileum. An interaction between LF and type of ground was detected (P=0.01). Low fibre and coarse-grounded diet reduced the biodiversity with respect to others three diets (266 vs 743 nuber of sequences, respectively). Low fibre diets reduced the presence of genera like Bacteroides respect to diets with 30% FND. These results suggest that gut microbiota can be modulated with diet.

Key words: level of fibre, type of ground, digestion, microbiota.