NUTRIENT DIGESTIBILITY STUDIES IN RABBITS INTAKE DIETS WITH THE ADDITION OF PROBIOTIC SUBTILPROBIO ® (*BACILLUS SUBTILIS* AND ENDOSPORES)

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ABSTRACT

The use of probiotics in rabbits can improve feed efficiency by improving gut integrity, nutrient absorption and digestive behaviour. In order to determine the digestibility of nutrients in rabbits intake diets with a probiotic mixture of *Bacillus subtilis* endospore (*Subtilprobio*®), 20 male rabbits of *New Zealand white* breed with 90 days of age and an average weight of 2.2 Kg housed in individual metabolism cages were used. They were distributed according to a completely randomized design in two experimental groups: Control and experimental without probiotic, with ten repetitions each. The probiotic was mixed in the diet at a rate of 1 l per ton of feed. During the 15 days that lasted the experiment, the last five days intake and fecal excretion were measured. Digestibility of dry matter (DM), crude protein (CP), organic matter (OM), neutral detergent fiber (NDF) and Ash (C) were measured. Differences for intake, excretion g of DM and OM digestibility were not observed. Rabbits who consumed the probiotic significantly improved ($P<0.05$) and ($P< 0.01$) digestibility of DM and NDF values of 72.79 % vs 77.98 % and 54.26 % vs 64.11 %, respectively. Similarly, the greater digestibility ($P<0.001$) of CP was observed in animals fed the probiotic with values 79.14 % vs 87.38 %, respectively. It was concluded that the use of Subtilprobio ® in rabbit diets improved indicators of digestibility for DM, NDF, and CP.

Key words: rabbits, probiotic, *Bacillus subtilis,* digestibility.

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Introduction

Worldwide probiotic preparations are used with satisfactory results to improve the production and health of animals behaviour (Swientek, 2003). This result is an overall enhanced health as a result of improved nutrition, increasing the rate of growth and production (Berg, 1998).
In rabbits, microbial cultures are used to reduce the incidence and death from diarrhea and to increase production efficiency. The studies were directed toward the control of intestinal pH using outside microflora rabbit bacteria (Cheeke et al.1989).
The use of *Bacillus subtilis* not only improves health but promotes intestinal digestion processes by matching nutrient and productivity of rabbits.
That is why the objective of this study was to determine the digestibility of nutrients in rabbits that consumed diets with probiotics based on mixture of *Bacillus subtilis* and endospores, ***Subtilprobio***®.

Materials and methods

Determination of chemical properties.

The diets were prepared at the National Center for Laboratory Animal Breeding CENPALAB). The chemical composition of the diets and feces was determined by the method described by the AOAC (1993) for dry matter (DM), organic matter (OM), crude protein (CP) and ash (C). Fractions of neutral detergent fiber (NDF), acid detergent fiber (ADF), lignin,

cellulose and hemicellulose were determined by Goering and Van Soest (1993). Dietary analysis determined containing: DM (88.02 %), CP (22.50%), ash (7.78 %), OM (92.21 %) and NDF (43.94 %) which were performed at the Laboratory of analytical services of the Institute of Animal Science .

Experimental Procedure

Twenty white *Semigiant New Zealand* commercial hybrid male rabbits of 4.5 months of age and 2.4 kg average weight were used. The animals were allocated in individual metabolism cages. They were distributed in a completely randomized design in two groups: A control group and the second was added Subtilprobio ® at a dose of 1l/1000kg of food. Each group had ten repetitions and 12h periods of light and darkness. Feeding was restricted to 120g per animal, shaped pellet during the 14 days of the experiment. During the last four days the feces were weighed and dry matter was determined at 105 ^{o}C. Feces were stored at -20 ° until analysis.

Calculation of apparent digestibility coefficient of nutrients

For the calculation of average coefficient apparent digestibility, nutrient formula described by Perez et al was used (1995).

$$ADNutrients = \frac{\text{Ingested nutrients (g)} - \text{Nutrients in feces (g)}}{\text{Ingested nutrients (g)}} * 100$$

Statistical Analysis

The analysis of variance was carried out according to the SPSS system for Windows version 1.0 and INFOSTAT (2001) indistinctly, where necessary Duncan (1955).

Results and discussion

Table 1 shows the results of intake, fecal excretion of DM and CP digestibility, NDF, OM and A were observed in rabbit.

A higher digestibility (P < 0.05) for DMN was observed in rabbits fed the diet with the probiotic . This improvement in DM digestibility is due to a significant increase (P<0.01) that had the NDF digestibility. This may be determined by a stimulation of cecal microbiological activity (Kimura et al. 1997), which favors higher digestion of cell wall constituents and other nutrients. In rabbits the digestion of cell wall components is limited by a poor retention of food in the cecum and the same characteristics of fermentible substrate. Stimulation with microbial content in these processes are favoured, increasing the digestibility and the final products of the fermentation.

Table 1. Effects of *Subtilprobio*® adding intake and fecal excretion (g dm / animal / day, and the digestibility of DM, CP, NDF, OM and C (%) in rabbits.

Indicators	Control	White Probiotic	Sig/EE±
Intake (g of DM/ animal/day)	130,66	145,36	7,68
Fecal excretion g of DM/ animal/day)	35,81	31,41	3,47
DM D (%)	72,79	77,98	1,70*
CP D (%)	79,14	87,38	1,47***
OM D (%)	72,94	78,05	1,67
NDF D (%)	54,26	64,11	2,12**
ASH D (%)	70,94	77,17	2,41

*(P<0,05)**(P<0,01)***(P<0,001)

Similarly the digestibility of CP was favoured (P<0.001). Samanya and Yamauchi (2002) and Teo and Tan (2007) determined that the use of *Bacillus subtilis* in the diet of rabbits promotes intestinal integrity and increases the efficiency of utilization and absorption of nutrients. Hence, the productive and reproductive performance of rabbit intake in this type of probiotic

with liveweight exceeding 225 g in the control and no death in rabbits at the lactation stage with weaning weights of 1.09 kg per group, improved (Rubio 2012).

No differences for consumption, fecal excretion, OMD and ashD in rabbits that consumed diets with or without probiotic were observed. The trend was to increase consumption and decrease the fecal excretion of DM, which showed the highest degree of utilization of nutrients, mainly starch, as a feature of this probiotic in producing enzymes like amilasa (Asgher et al 2006).

We conclude that the use of diets with *Bacillus subtilis* and endospores in the diet of rabbit, improved the indicators of digestibility for DM, NDF and the CP without causing changes in the digestibility of A, OM and intake and excretion g of DM.

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