

Physical-Chemical and Microbiological Characterization of LEBAME for its Use as a Probiotic in the Feeding of Rabbits in Growth-Fatten

Suarez C^{1*}, Mora L², Savon L³, Carrera E¹ and Villegas ME¹

¹Cuban Research Institute on Sugar Cane Derivatives (ICIDCA), Cuba

²Swine Research Institute (IIP), Cuba

³Institute of Animal Science (ICA), Cuba

*Corresponding Author: Suarez C, Cuban Research Institute on Sugar Cane Derivatives (ICIDCA), Cuba.

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Abstract

The need to increase the availability of meat of high biological value for human consumption imposes the search for alternatives in species with high prolificity as the rabbit. The growers suggest that between the birth and the end of fattening, there is mortality close to 20% and that one of its fundamental causes are digestive diseases. The present work is based on a preliminary study of the physical-chemical characterization of LEBAME and its possibility of use in the feeding of rabbits in growth-fattening. Different batches of the product were evaluated, obtaining results that demonstrate a possible probiotic effect, so if this product is used in rabbit feeding, favorable results would be obtained in the productive performance and animal health, decreasing the presentation of diseases and occurrence of deaths, which translates into greater productive efficiency.

Keywords: LEBAME; Rabbit; Probiotics and Characterization

Introduction

According to the latest report of the United Nations for Food and Agriculture-FAO (2018), almost 820 million people suffered from hunger in 2017, a number that increases for the third consecutive year, mainly due to climate change, conflicts and deceleration of the Economy of many regions of the world.

Thus, it is imperative to look for production alternatives that reduce this hunger and malnutrition situation, where it can be produced in a short space of time, bringing benefits for the producer, food security for consumers and sustainability to the environment.

The rabbit is known for its prolificity, 6-8 deliveries/female/year can be obtained, with a production of 35 to 55 rabbits/rabbit/year, when ensuring good food and sanitary conditions. The growers suggest that between the birth and the end of the fattening there is mortality close to 20% and that one of its fundamental causes are digestive diseases, due to gastrointestinal disorders caused by bacteria and parasites [1,2]. That is why one of the main prophylactic measures, in the breeding of this species, should focus on these pathologies. A good fattening or what is the same a good performance of the exploitation is the result of a rigorous sanitary condition.

Probiotics or biological additives are made up of live microorganisms, which have a beneficial effect on the host's health [3]. Hence the importance of introducing their employment in the production systems, since this would guarantee to improve the indicators of production and animal health, resulting in a greater food availability for the population.

LEBAME is a bioproduct consisting of the following microorganisms from the ICIDCA crop collection: *Bacillus subtilis* B/23-45-10 Nato, *Lactobacillus bulgaricum* B/103-4-1 and *Saccharomyces cerevisiae* L-25-7-12. It is produced from an inoculum of these microorganisms, with final cane honey and water through a fermentation process. This product was evaluated by ICIDCA and IIA, by its acronym in Spanish as an efficient microorganism in the treatment of broiler chicken beds and laying hens' pits, achieving environmental improvements in the warehouses, as well as the decrease in vectors and disease presence [4].

The microorganisms that make up this product have been evaluated as probiotics finding positive effects, especially in increasing production indicators and a better sanitary condition and intestinal health, so they have been authorized for use in animal feed According to GRAS (Generally Recognized As Safe) or its equivalent in Europe QPS (Qualified presumption of safety) [5].

Materials and Methods

In order to carry out this experiment, three samples were chosen at random from 3 batches of LEBAME production and their physical-chemical characterization was carried out in the ICIDCA biochemistry laboratory, determining the pH, gravimetric dry matter (DMG), lactic acid, total reducing sugars (TRS) and nitrogen, according to the methodology proposed by the AOAC [6]. The pH determination was carried out potentially metrically. The (DMG) was performed by drying at 105°C, for 12 hours and weighed to its constant weight. Total reducing sugars (TRS) was determined by the classic method of Eynon and Lane.

The microbiological characterization was carried out in the ICIDCA microbiology laboratory, through classical microbiology by counting the most probable number (MPN) determining the colony forming units of bacteria and yeasts, in addition to determining the presence of total coliforms.

Results and Discussion

The following table shows the results of the physical-chemical characterization of LEBAME.

Parameters	Unit	Value
pH	-	4,39
TRS	g/L	2,2
Nitrogen	g/L	1,75
DMG	g/L	2,26
Lactic acid	mg/L	4,58
Bacteria	CFU/mL	3x10 ⁸
Yeasts	CFU/mL	2x10 ⁷
Absence of total coliforms		

Table 1: Physical-chemical and microbiological characterization of the LEBAME.

The pH of the substances is determinant so that many reactions are carried out, both in the internal processes of living beings and in the preparation of products intended for animal feed since this will largely depend on the survival of the microorganisms formulated in this product. It is observed that the pH of LEBAME is acidic, which allows the microbiological control of the product in the first place, avoiding the presence of other microorganisms causing decomposition.

Reported growth values of *Lactobacillus* spp. in pH between 2.5 - 6.4. On the other hand [8] they demonstrated the survival at acidic pH of 2 of *Bacillus subtilis* subsp. *subtilis*, in addition to the sporulation capacity of this microorganism. On its side the *Saccharomyces c.*,

according to studies carried out by Cabrera and Beldarrain [9], they verified that this yeast is capable of overcoming the barriers of the gastrointestinal tract by tolerating pH values equal to 2.5.

The rabbit has a lot of pH variability in its digestive system, oscillating along the digestive tract from a very acidic pH in the stomach (pH 1-3), at a pH close to neutrality (pH 6.4 - 6.7) in the small intestine, and in the cecum pH of about 6 are reported.

The following figure shows the microbial activity in different monogastric species along the gastrointestinal tract, according to Borg Jensen 1993, cited [10].

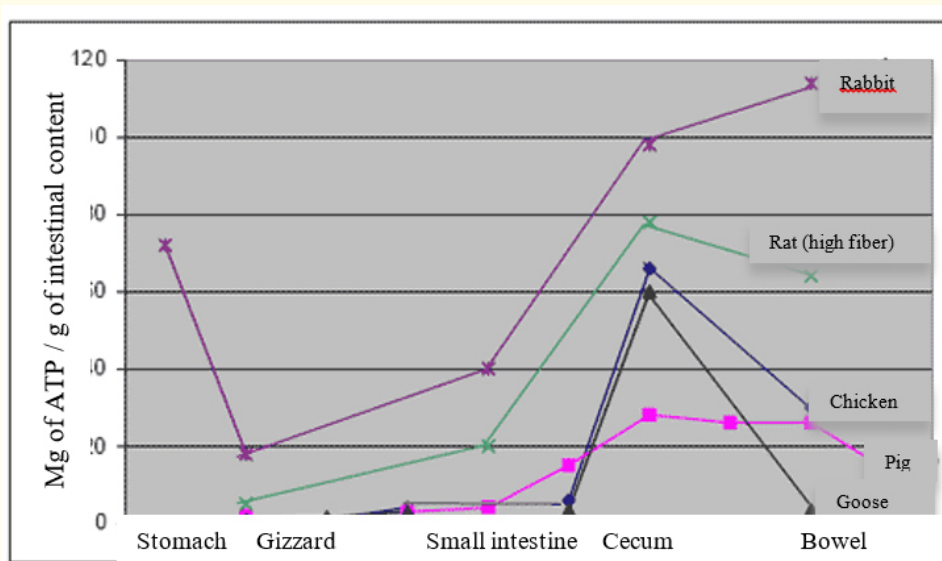


Figure 1: Microbial activity in the digestive system of some monogastric species.

Source: Borg Jensen, 1993, cited by Gauthier 2005 [10].

The lactic acid contained in LEBAME, in addition to giving the product a pleasant taste, protects it against the action of other pathogenic microorganisms and, on the other hand, gives the product stability and, on the other hand, in the rabbit's digestive system, like all organic acids, improves the digestive process, increasing ingestion and avoiding the occurrence of enteric processes.

The determination of the content of reducing sugars is an indirect measure of the progress of the fermentation of LEBAME, since lactose is the main substrate for microbial growth so its value of 2.2 mg/L is expected because it is consumed by the microorganisms present in the culture.

The nitrogen present in LEBAME, in addition to a source of nutrition for microorganisms, can also be absorbed by animals, which represents an additional source of nutrients.

The bacterial and yeast count observed in the LEBAME allows us to evaluate the product as a probiotic since the concentration of colony forming units is greater than 10^6 /mL, which is one of the characteristics that a product must meet to be considered probiotic.

Conclusion

The microorganisms present in LEBAME can survive the passage through the rabbit's digestive system, so with the inclusion of LEBAME in the diet of rabbits we can obtain a favorable impact on gastrointestinal health and efficiency in productive indicators. Therefore, LEBAME can be evaluated as a probiotic in the cunicle species.

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