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AMAZONIA, HEALTHY FOOD AND RURAL COMMUNITIES IN PASTAZA-ECUADOR

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Abstract: *The current situation and perspective of feeding with a focus on a healthy diet with probiotics in animals are evaluated in the Ecuadorian Amazon conditions. Surveys were conducted in the Ecuadorian Amazon communities to determine the current and prospective situation in organic and healthy foods production. In the Amazon region, diagnoses indicate that, despite the large amount of natural resources, an important part of this population is subject to problems of availability, economic access and use of food that affecting their food security. The levels of agricultural production, with benefit, are very low and agro industrial processes for getting products, through processing, are scarce. It was evaluated Lactobacillus salivarius and Bacillus subtilis probiotic cultures as probiotic in broilers. These probiotic got better many indicators in the animals. In Lactobacillus salivarius, coliformes count was higher in the groups without probiotics, while total anaerobes were higher in the animals with probiotic. Bag of fabricio and the spleen weight were greater in those treated with the probiotic. The Newcastle vaccine antibodies did show differences among treatments where probiotics were applied. Cecal content pH was lower in the treatments with probiotics. Total fatty acids showed higher values in broilers with the probiotics, however, the acetic, butyric and propionic acid did not provide differences between treatments. Bacillus subtilis show a higher total anaerobes count in treatments with the cultures, while the coliform count decreased in these one. Lactobacillus spp and endospores were superior in the treatments Bacillus subtilis.*

Keywords: *Functional feeding, indigenous peoples, probiotics, Lactobacillus salivarius, Bacillus subtilis.*

Introduction: *A food may be considered "functional" when it is demonstrated that, in addition to its nutritional effects, beneficially influences functions of the organism in a way that improves health or well-being or reduces the chronic degenerative disease risk [1].*

The main components of functional foods are intestinal microflora balancers (probiotics, prebiotics and symbiotics), antioxidanets and dietary fiber [2]. Probiotics are non-pathogenic microorganisms that, when ingested, exert a positive influence on the health or physiology of the host [3]. It proposed to define probiotics as "a preparation of a product containing viable, defined and sufficient microorganisms which alter the microflora in a host compartment and therefore exert beneficial effects on the host health" [4]. Antioxidants are compounds whose *primary function, in the body, is to protect against the oxidative damage caused by molecules known as free radicals. This oxidative damage is responsible for important degenerative diseases of the circulatory system, cardiovascular and cancer, which are today the leading cause of death in society [5]. Dietary fiber is part of a healthy or functional diet. There is still no single definition that encompasses the different dietary fiber components and its functions. The major factors of fiber are complex carbohydrates and lignin, although new products may be included in the fiber concept in the future. The objective of the present study was to evaluate, in the conditions of the Ecuadorian Amazon, the current situation and perspective of feeding with a focus on a healthy diet with results of the probiotics use in birds.*

Materials and Methods:

Surveys were conducted in the Ecuadorian Amazon communities to determine the current and prospective situation in the organic and healthy foods production. In relation to the biopreparates evaluated in broilers with of Bacillus subtilis culture, 5 l of product with three cultures in modified media were prepared. The microbial count was performed according to the standards of Microbiology of Food for Human and Animal Consumption according NC-ISO and [6]. For the evaluation of the probiotic activity, 200 chickens from the female EB34 reproductive line of 1-42 days of age were used according to the methodology of [7] and to Bacillus subtilis and [8] to Lactobacillus salivarius. Microbiological, related to the immune response, fermentative and hematological indicators were studied in the broilers according to Technical Instructions for chicken feed (1998).

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Results and Discussion:

In the Amazon region, diagnoses indicate that, despite the availability of natural resources, an important part of this population is subject to problems of availability, economic access and use of food, affecting their food security. The levels of agricultural production are very low and the agroindustrial processes for the products production with benefit, through processing, are scarce.

Today there is an irrational and extractives use of biodiversity: Illegal woodcutting and trade in birds and other animals. Little is taken of the opportunities offered in various sectors (pharmaceutical, cosmetic, food and ecotourism) as a generation of fair income for families. In summary, the studies conclude that food security can be achieved in the Amazon, to the extent that increases in the availability of adequate food, in a sustained and permanent manner, through successful use of natural resources. Substantial increases in agricultural production and productivity; the local markets expansion, to expand demand and stimulate production, increasing in exportable production and the food conservation techniques development, at the family level.

Biopreparates evaluation with Lactobacillus salivarius in broilers.

Chickens used in the experiments showed the higher coliform population ($P < 0.01$) in the control group than in the treated animals, while the lactobacilli presented higher proportions ($P < 0.001$) in the groups treated with biopreparates respect to the control. For the total anaerobes counts, differences between treatments at 42 days ($P < 0.001$) were observed with an increase of these microorganisms in the animals where biopreparations were applied. Yeasts were observed at 42 days and their presence, but with no differences between treatments.

The immune system of the birds undergoes significant changes, which appear in the different stages of development. According to Giambrone (1996) in a first stage of life, the Fabricio bulsa and the thymus are presented as the main organs of immunity. Fabricio bag produces B-lymphocytes, which are responsible for humoral immunity (antibodies production by B lymphocytes) and the second, generates cell-mediated immunity (cytokines production and by T lymphocytes). With the use of Lactobacillus salivarius biopreparates, at 42 days, the effect of the biopreparates on the immunological indicators was superior. In the Fabricio bag and the spleen weight, no differences were observed in the animals treated with the biopreparates, but there was differences with the control group ($P < 0.01$). The HI titres for the Newcastle vaccine do not show differences between the treatments where the biopreparates were applied. However, *the data differed (P <0.001) with those of the control group, when higher values were obtained in the animals. Gut content pH was lower (P <0.05) in the treatments where the biopreparates were applied respect to the control group. Total CFAs showed higher values (P<0.05) in the broilers treated with the biopreparates in relation to the control; however, the values of acetic, butyric and propionic acid separately did not provide differences (P<0.05) between treatments. In the poultry digestive system, there is a relationship between the pH and the bacteria that are established, since an acidic pH inhibits growing of harmful bacteria. Newborn chicken maintains an almost sterile TGI, with ideal conditions for the of pathogenic bacteria proliferation; however, young birds do not have the capacity to produce enough hydrochloric acid to maintain acidic pH [9]. Therefore, the application of these beneficial bacteria, from the first hours of life, contributes to decrease the pH of the blind, due to the fermentative processes that these microorganisms develop in the ecosystem with the organic acids production [10].*

Evaluation of biopreparates with Bacillus subtilis in broilers.

For total anaerobes, a higher count (P <0.001) was observed in broilers treatments with Bacillus subtilis cultures. Coliforms number in the treatments with Bacillus subtilis cultures decreased (P<0.001). Lactobacillus and endospores, at 42 days, had higher values (P <0.001) in treatments with Bacillus subtilis. The probiotic products application based on Bacillus spp. cultures, in sporulated form, as microbial balance is informed by [11]. Studies carried out by Rondon define one of the probiotic cultures actions from Bacillus spp endospores as the decrease in enteropathogens [8], caused by an increase in the population of Lactobacillus spp, the decrease of pH levels and the increase of levels of AGCC and lactic acid. Decrease in coliforms and the increase of the populations of total anaerobes and Lactobacillus spp is related to the action of the endospores and acetic and lactic acids that occur at the level of the intestinal tract. It is observed that the Fabricio bag, spleen and HI Titers for the vaccine response measured by the Newcastle vaccine are superior (P<0.001) in the treatments with Bacillus subtilis. Acetic acid and propionic acid levels (P<0.05) were higher for all treatments with Bacillus subtilis. It is important the role of these acids in the control of bacterial growth of intestinal enteropathogens [12]. In addition, a trophic effect on the intestinal epithelium is manifested, which favors the processes of digestion and nutrient absorption with a favorable response in the productive indicators of live weight and feed conversion [13]. However, butyric acid, which contributes with greater weight to the trophic effect [14], does not express differences between treatments, in any of the stages evaluated.

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Conclusions:

For the biopreparates with Lactobacillus salivarius the coliform population was higher in the groups without biopreparates, in total anaerobes differences between the treatments were observed with an increase of these microorganisms in the animals with biopreparates. With the use of biopreparates in the PR of the Fabricio bag and PR of the spleen, no differences were observed in the animals that were treated with the biopreparates, but with the control group, which showed lower values. The HI titres for the Newcastle vaccine did not show differences between the treatments where the biopreparates were applied, however, the data differed with those of the control group, when higher values were obtained in the treated animals. The pH of the cecal content was lower in the treatments where the biopreparates were applied with respect to the control group. Total CFAs showed higher values in broilers treated with biopreparates, however, acetic, butyric and propionic acid values separately did not provide differences between treatments.

In the case of biopreparates with Bacillus subtilis in total anaerobes, a higher counting was observed in the treatments with the cultures, the count of coliforms decreased in the treatments with the cultures.

On the other hand, Lactobacillus and endospores, presented superior values in the treatments with the cultures studied. The Fabricio bag, spleen, and HI titers for the vaccine response measured by the Newcastle vaccine are superior in Bacillus subtilis treatments. Higher AGCC values were found for treated chickens, while acetic and propionic acid levels (P <0.05) were higher for all bioprepared treatments..

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