



## Economic Considerations on Fermented Feedstuffs Using Multipurpose Autochthonous Microorganisms in Pre-fattening Pigs

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### INTRODUCTION

Feeding costs account for two thirds of costs in swine productions. This issue could be addressed through better utilization of nutrients along the intestinal tract thanks to a stable microbiota. Accordingly, studies have suggested the inclusion of certain plants, organic acids, prebiotics, probiotics, and natural microbial mixtures, such as efficient microorganisms (EM), or versions among which IH-plus and MAM (multipurpose autochthonous microorganisms) stand out (Barreto *et al.*, 2017).

The administration of fermented liquid feeds in post-weaned animals is perhaps the simplest variant to substitute antibiotics as growth promoters. These products help repair the damage of the common intestinal microvilli observed at this stage (Rodríguez *et al.* 2021). This study evaluates the economic feasibility of using fermented feeds with multipurpose autochthonous microorganisms in pre-fattening pigs.

### DEVELOPMENT

The experiment was conducted at the Basic State Unit (UEB) Mixto Porcino MININT, in Camagüey. A total of 60, 30 day-old weaned pigs (York Land x CC21) animals were included, with an average weight of 8.1 kg; the animals were selected at random and divided into three groups: G-1 (control): fed on starter feeds without the inclusion of the multipurpose autochthonous microorganisms (MAM). The animals in this group received Levamisol (Labiofam, Cuba), and Shotapen ® L.A in the first week, whereas Fortius ® L. A was

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administered in the fourth week, according to the preventive program of respiratory and parasitic processes (Rodríguez *et al.*, 2021). G-2 received 1/3 of starter feeds fermented with MAM for 12 hours. G-3 followed the same procedure, but with a 24h fermentation. No medication was administered to the experimental animals. The fermented liquid feeds were supplied to the animals in the early morning hours; for the rest of the day, they consumed starter feeds (2/3 of the ration) (Rodríguez *et al.*, 2021). The animals were weighed twice: at the beginning (30 days old), and at the end of the experiment (75 days old).

The economic analysis relied on the data recorded in the medication inputs invoices, and the corresponding programs to prevent respiratory and parasitic processes, related to the price, dosage, frequency, treated animals, mean salary of the technician, veterinarian, and time consumed. In G-1, the cost of medication, salary, total and unit cost of each conventional treatment per pig was included. In the experimental groups (G-2 and G-3), the same cost was assumed, as the same dose was administered. The cost of 1 L of MAM (mother liquid) was established according to Sánchez (2011), then the costs associated with activation, treatment frequency, salary, total and unit costs were determined in every pig. Besides, the economic impact resulting from final weight increase was evaluated. The main results are shown below.

The economic assessment evidenced that the costs of conventional preventive programs were higher in every indicator compared to the estimations for MAM. The medication-related costs were significant (Table 1). It is worth noting that 1) The former did not include the depreciation of veterinary inputs and instruments needed for this activity, such as hypodermic needles, syringes, gloves, disinfectants, etc.; 2) The containers used for MAM did not increase the costs, since they were recycled from purchases of biologicals made by Labiofam, whose cost was assumed by different farm productions. The cost of water consumption was not included, since the production conditions do not permit it. The application does not require specialized or professional staff, only discipline and regularity.

**Table 1. Comparison of costs according to the type of treatment\***

Medication	Costs/medication	Costs/salary	Total costs	Costs/pigs
Shotapen ® LA	2.84	55.21	58.05	2.90
Fortius ® LA	23.06	55.21	78.27	3.91
Levamisol	3.65	27.6	31.25	1.56
Control program	29.55	138.02	167.57	8.37
MAM	3.01	80.96	83.97	4.20

\* All the values are expressed in Cuban Pesos (CUP).

Among the advantages of the technology of efficient microorganisms, the basis of MAM technology, according to its author, Teruo Higa, in the 1970s, emphasized on the economy of treatments (Barreto *et al.*, 2017). Other publications inspired in the same source confirm it (Zamora, Ortiz, and Utria, 2020). Surprisingly, none includes a cost analysis like the one suggested in this study. Generally, the criterion derives from differences in the final weights

(Montejo-Sierra *et al.*, 2017). Other researchers base their economic analysis on the savings achieved when preventing or minimizing costs associated with medication and treatments of gastrointestinal diseases (Mukherjee, Chakraborty, and Dutta, 2016). In this sense, the administration of rations fermented for 24 hours using MAM improved the hematological indicators of pre-fattening animals after 45 days of consumption (Rodríguez *et al.*, 2021).

The comparison of final weights favored the animals that consumed liquid feeds fermented with MAM for 24 hours (Table 2). It shows that an increase in the fermentation time improves the nutritional quality of the product, as similar experiences have demonstrated, using cassava (*Manihot esculenta* Crantz), and other low protein sources (Mukherjee, Chakraborty, and Dutta, 2016; Polyorach *et al.*, 2018). This result may be conditioned by the prebiotic and/or effectiveness of MAM; anatomical and physiological re-establishment of the intestinal microvilli; the utilization of a more nutritional and more easily digested product, and so on (Polyorach *et al.*, 2018; Zamora, Ortiz, and Utria, 2020; Barreto *et al.*, 2021; Rodríguez *et al.*, 2021).

**Table 2. Comparison of costs per treatment in final weight evaluation\***

Groups	Total costs	Income	Profits	Difference vs control
Control	1 490.27	19 392.46	17 902.20	
12 hours	1 545.24	18 175.36	16 630.12	-1 272.08
24 hours	1 293.40	21 583.24	20 289.84	2 387.65

\* All the values are in Cuban Pesos (CUP).

## CONCLUSIONS

The feeds fermented for 24 hours using multipurpose autochthonous microorganisms constitute an economical and effective choice for the nutrition of pre-fattening pigs.

## REFERENCES

- Barreto Argilagos, G., Bidot Fernández, A. I., Rodríguez Torrens, H. D. L. C., & Delgado Fernández, R. (2017). Microorganismos autóctonos multipropósito en las producciones caprinas. [http://scielo.sld.cu/scielo.php?script=sci\\_arttext&pid=S2224792020190001000-55](http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2224792020190001000-55)
- Montejo-Sierra, I. L., Lamela-López, L., Arece-García, J., Lay-Ramos, M. T., & García-Fernández, D. (2017). Efecto de dietas no convencionales con microorganismos nativos en la cría porcina. *Pastos y Forrajes*, 40(4), 308-314. [http://scielo.sld.cu/scielo.php?script=sci\\_arttext&pid=S0864-03942017000400008](http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-03942017000400008)
- Mukherjee, R., Chakraborty, R., & Dutta, A. (2016). Role of fermentation in improving nutritional quality of soybean meal—a review. *Asian-Australasian journal of animal sciences*, 29(11), 1523. DOI: [10.5713/ajas.15.0627](https://doi.org/10.5713/ajas.15.0627)

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- Polyorach, S., Wanapat, M., Pongchompu, O., Cherdthong, A., Gunun, P., Gunun, N. & Kang, S. (2018). Effect of fermentation using different microorganisms on nutritive values of fresh and dry cassava root. *Asian J. Anim. Vet. Adv.*, 13, 128-135. DOI: [10.3923/ajava.2018.128.135](https://doi.org/10.3923/ajava.2018.128.135)
- Rodríguez, H; Barreto, G; Lapinet, A; Montejo, IL; Beretervide, PJ; Contino, Y; Vázquez, R. (2021). Behavior of Hematologic Indicators in Pre-Fattening Pigs Fed with Multipurpose Autochthonous Microorganisms' Fermented Concentrates. *EC Veterinary Science*, 6(4), 17-23. <https://www.ecronicon.com/ecve/pdf/ECVE-06-00375.pdf>
- Sánchez, V. (2011). *Evaluación de alternativas de inversión para la producción del bioproducto IHplus* (Doctoral dissertation, Tesis en opción al Título de Máster, Universidad de Matanzas Camilo Cienfuegos, Cuba). <https://vdocumento.com/evaluacion-de-alternativas-de-inversion-para-la-este-bioproducto-se-utiliza.html>
- Zamora-Davila, A., Ortiz-Milán, A., & Utria-Borges, E. (2020). Efecto de microorganismos eficientes vs. probióticos Vitafer en el control de desórdenes digestivos en preceba porcina. *Hombre, Ciencia y Tecnología*, 24(4), 100-109. <http://www.ciencia.gtmo.inf.cu/index.php/htc/article/view/1075>

### **AUTHOR CONTRIBUTION**

Conception and design of research: HCRT, GBA; analysis and interpretation of data: HCRT, GBA, and MHC; redaction of the manuscript: GBA.

### **CONFLICT OF INTERESTS**

The authors declare the existence of no conflicts of interests.