



DIAGNOSTICAR: COMPUTER SYSTEM FOR THE PRODUCTIVE DIAGNOSIS OF CATTLE FATTENING UNITS

DIAGNOSTICAR: SISTEMA INFORMÁTICO PARA EL DIAGNÓSTICO PRODUCTIVO DE UNIDADES DE CEBA VACUNO

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A computer tool was developed for the diagnosis of fattening livestock activity based on productive efficiency indicators as an alternative for the analysis of management strategies in each scenario. The program was created in NetBeans development environment, version 8.2, and was implemented with Java programming language. It was designed with an architecture divided into layers, the service interface and the data access. The program has a pleasant visual appearance and has two functions: administrator and user. The computer application allows the livestock user to know the efficiency degree with which the production unit works, through the stock efficiency field and to make an opinion about the productive indicators in a given period. By considering these fields and their results, strategies can be drawn up to bring the livestock unit to acceptable production levels.

Keywords: *computer application, fattening cattle*

Se desarrolló una herramienta informática para el diagnóstico de la actividad ganadera de engorde a partir de los indicadores de eficiencia productiva como alternativa para el análisis de las estrategias de manejo en cada escenario. Se confeccionó el programa en el entorno de desarrollo NetBeans, en su versión 8.2, y se implementó con el lenguaje de programación Java. Se diseñó con una arquitectura dividida en capas, la de interfaz de servicios y la de acceso a datos. El programa cuenta con una apariencia visual agradable y tiene dos funciones: administrador y usuario. La aplicación informática permite al usuario ganadero conocer el grado de eficiencia con que trabaja la unidad de producción mediante el campo eficiencia de *stock* y realizar un dictamen acerca de los indicadores productivos en un período determinado. Al considerar estos campos y sus resultados, se podrán trazar estrategias para llevar la unidad pecuaria a niveles aceptables de producción.

Palabras clave: *aplicación informática, ganado de engorde*

According to data provided by the National Statistics Office of Cuba (ONEI 2023), it is evident that beef production in Cuba is below its historical levels and does not meet population needs. In this situation, the efficient management of soil resources and productive means in general is highly important. For this reason, in cattle fattening units, it is necessary to know the evolution of production over time and evaluate the impact of technological factors to determine the efficiency with which livestock activity is carried out in the company with the purpose of improving productivity (Oviedo and Rodríguez 2011).

Productive efficiency will depend on various factors, which act independently or in a related manner. This term fundamentally refers to the relationship between inputs and what is produced (Barahona and Barahona 2023). Consequently, organizations research on how to make proper

use of raw materials to find possible savings in their use. That is to say, a productive unit is more efficient than the other if it manages to produce more meat or milk with the same amount of inputs.

Efficiency indicators are located in two large groups. In the first group, there are those related to reproduction, such as birth of calves and pregnancy percentage, among others. In the second group, there are those of productive efficiency (animal load, calving distribution, increase in live weight from birth to weaning and actual weaning weight, among others) that allow to advice on management measures or to discover causes for low production. Therefore, the objective of the study was to implement a computer system for the diagnosis of meat production based on efficiency indicators in each production scenario.

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The computer system was developed by a multidisciplinary team from the Applied Biostatistics and Ruminants departments of the Institute of Animal Science (ICA). To calculate the economic indicators (initial inventory, final inventory, input and output), the prices issued by the *Gaceta Oficial of the Republic of Cuba (2021)* were taken. The formula proposed by *Bavera and Bocco (2001)* was selected to calculate the stock efficiency of the cattle herd.

The computer application was designed in the NetBeans development environment, version 8.2. The program was programmed with an architecture divided into layers. The interface layer, managed by the JavaFx and SceneBuilder graphic library, where the components and buttons adjust to the size of the screen on which the computer system is running. The second layer has a service module (*Balance_servise*) that is responsible for data input and output functionalities.

DIAGNOSTICAR provides a pleasant visual appearance and has good functional quality. When starting the system, a welcome screen is displayed. To begin the diagnosis, you must click on the enter data button. When this action is performed, data entry window is displayed (*figure 1*), which contains the necessary fields in the center of the screen to perform the diagnosis of the cattle fattening unit.

The computer system (*figure 1*) allows the livestock user to make a production assessment of the unit in a given period. For this reason, it is mandatory to fill in the fields start date (*inicio*) and end date (*fin*). The rest of the fields are focused on knowing the existence of the animals in the unit by classification, among yearlings, young bulls and bulls in the period under study. With this data entry, the information is validated and the user is alerted about any error that was made (empty data, letters instead of numbers, anomalous data) in the process of completing the fields so system failures are avoided at the arrival, which ensures a greater degree of veracity of the provided results.

Once all mandatory data (*) are filled in, the *diagnóstico* button must be clicked to estimate the productive indicators that allow the analysis of the fattening unit (*figure 2*).

Total meat production, as well as production per surface or stock, allows the user to know the performance of the unit in the period under study. DIAGNOSTICAR has an indicator called **stock efficiency**, which offers a clear idea of the efficiency degree with which the unit works. This result is based on the relationship between inputs and the achieved production. That is, it is more efficient if with equal inputs (hectares and number of cows) more kilograms of beef are produced per hectare. By considering these fields, strategies can be drawn up to reach acceptable production levels in the livestock unit.

	Años:	Torettes:	Toros:
Animales Inicio*(U)	<input type="text"/>	<input type="text"/>	<input type="text"/>
Kg x Animal:(kg)	2170	3375	3225
Compras:(kg)	<input type="text"/>	<input type="text"/>	<input type="text"/>
Traslados:(kg)	4270	<input type="text"/>	<input type="text"/>
Ventas:(kg)	<input type="text"/>	<input type="text"/>	855
Sacrificios:(kg)	<input type="text"/>	<input type="text"/>	9280
Muertes:(kg)	180	105	525
Animales*(U)	32	38	33
Kg x Animal*	98	150	230

Figure 1. Data entry screen for the computer system

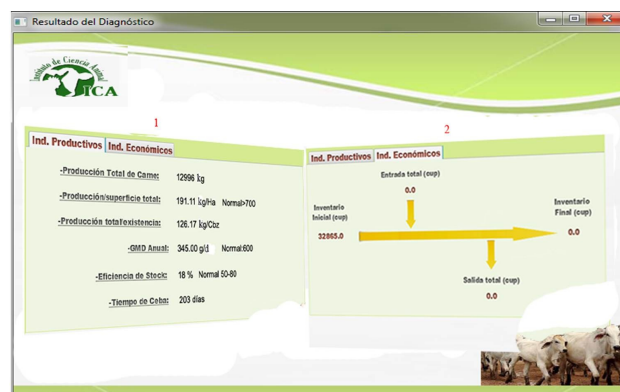


Figure 2. Computer system results screen

On this same screen, a tab with **economic indicators** (*figure 2*) is shown, obtained by the livestock unit. The results of productive efficiency allow to know whether the unit has favorable economic values. It also shows the monetary inventory in Cuban pesos (CUP) that makes it possible to know precisely the income and outputs of the production system. The tab offers the option to update beef prices to the system. This result, together with production indicators, will allow a complete diagnosis of the livestock unit. With DIAGNOSTICAR, managers will be able to make appropriate decisions, in order to improve the efficiency of beef production.

It is concluded that DIAGNOSTICAR computer system facilitates information on breeding processes in cattle fattening units. It allows a quick and precise interaction with the productive and economic data of the unit, which speeds up decision-making to draw up strategies that help achieve an efficient production in the livestock unit.

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