SIMULATION STRATEGIES CONSIDER IN THE AGROINDUSTRY PRODUCTION

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ABSTRACT

The agriculture, process that depends on climatic factors, when these are strong affects the production. This one can simulate pair to create the best stage across the optimization, with it it will be a question of minimizing the costs and risks interfered in it.

The production of a product will be simulated across VENSIM, there will take the best stage and ideal analysis of seeds, also the average environmental system will talk each other.

Keywords: Academic, Laboratory, machines, reconversion, byword.

INTRODUCTION

The simulation is one of the tools for analyzing the design and implementation of a complex production system. The computer model of forage production hydroponics is used to understand the production system designed to evaluate various strategies with which it could operate. With the simulation is to understand the evolution over time (Aracil & Gordillo, 1997). According Aracil & Gordillo entire system has an entity that characterizes it, which is why the system of hydroponic fodder production has particular characteristics that differentiate it from other production systems which were maintained over time to an environment that presents changes. The simulation of the dynamic systems VENSIM using the computer program is developed for the production of hydroponic fodder with the mood to find a description of the behavior of the system designed taking into account the variables and parameters that are related to each other.

The methodology used initially raised the functions of the design process of hydroponic forage production, which defines the input parameters of the system simulate the flow variables and state and performs the mathematical model for VENSIM.

1. SIMULATION TOOL USED.

VENSIM is an environment of the dynamics of the system, ie using a programming language specific. The programming is done in graphical form or writing differential equations. Aracil & Gordillo (1997) recommended the use of specific programs as VENSIM released because the programmer's job to implement algorithms for integration.

The use of these tools is based on understanding and simulation of the systemic relations of the process that achieved with VENSIM. The simulation program handles this kind of continuous variables such as those presented for the production of hydroponic fodder.

The results with VENSIM relate with respect to the dynamic behavior of the production system, but do not determine the physical constitution of the system (Ramirez Herrera, 2008).

2. ROLE OF DESIGN IN PRODUCTION OF HYDROPONIC GRASS CONDITIONS.

This section develops a design function taking into account the parameters involved in the process and the variables of the same. The development of a design function is intended to provide a system dynamics model that represents the system of forage production proposed as an alternative feed for cattle.

3.1. Parameters Entry Process.

For the design of the input parameters of the production process of grass develops Forrester diagram of Figure 1 which shows the interaction between the parameters, variables and flow of state. In Table 1 you can see the values that are taken for the parameters designed that are the result of research conducted in the design of the production process of hydroponic fodder for Herrera (2008).

Table 1. Values for the input parameters of the process.

Parameter Input	Notation	Value	Unit
Consumption of nutrient.	Cn	24	Kg / m^2
Sowing area.	As	77,76	m^2
Consumption of seeds.	Cs	1,5	Kg / m^2
Water consumption.	Ca	18	Kg / m^2
Estimated time of production.	Tp	12	Días
Number of cattle	Nb	40	Bovinos
Consumption of Cattle	Cb	216	Kg
Production by area sown.	Pas	115,74	Kg / m^2

Source: Taken from Herrera (2008a).

3.2. Variable Flow Process and State.

The variables of the production process of grass are shown in Figure 1. The process is done by modeling the dynamics of systems[1] with a diagram of Forrester. With this proposed method can be observed variables and flow of state involved in the process. The variable flow according Aracil & Gordillo (1997) are the most important and represent the magnitudes whose development is particularly significant. The flow variables are those that determine the variation of the state variables with time.

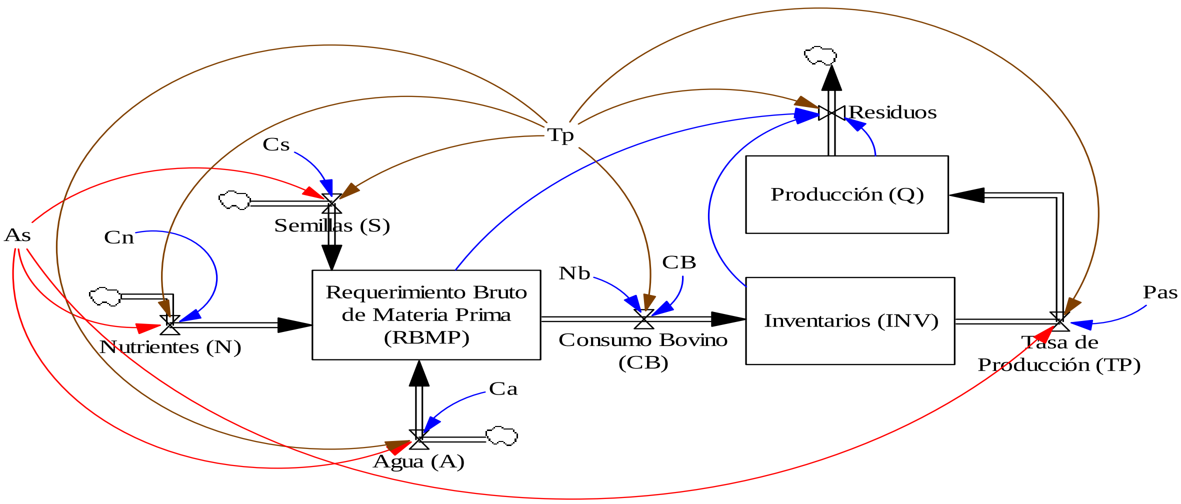

Figure 1. Forrester diagram for the production system of hydroponic grass.

The notation used for the diagram of Figure 1, according to the state variables and flow are shown in Table 2 with the initial conditions of the system for each variable. The notation of each parameter can be found in Table 1 with their respective values.

Table 2. Original terms of the variables flow and system status.

VARIABLE FLOW		
Variable	**Notation**	**Unit**
Nutrients	N	Kg / day
Seeds.	S	Kg / day
Water	A	Kg / day
Cattle consumption	CB	Kg / day

[1] The dynamics of systems, introduced by Jay W. Forrester analyzes the structure of the system and generate from this behavior (Aracil & Gordillo, 1997).

Rate Production	TP		Kg / day
Waste	---		Kg / day
VARIABLES OF STATE			
Variable	**Notation**	**Start Value**	**Unit**
Gross feedstock Requerimiento.	RBMP	0	Kg
Inventory	INV	0	Kg
Production	Q	0	Kg

3.3. Role Modeling Design Process.

Following is the equation that models the design function with its own notation used for VENSIM:

Equations level:

$$(1) \qquad \frac{d(RBMP)}{dt} = \mathbf{CB} - \mathbf{A} + N + s$$

$$(2) \qquad \frac{d(INV)}{dt} - TP - CB$$

$$(3) \qquad \frac{d(Q)}{dt} = TP - Residuos$$

Flow equations:

$$(4) \qquad N = \frac{Cn * As}{Tp}$$

$$(5) \qquad S = \frac{As * Cs}{Tp}$$

$$A = \frac{As * Ca}{Tp} \quad (6)$$

$$CB = \frac{Cb * Nb}{Tp} \quad (7)$$

$$TP = \frac{Pas * As}{Tp} \quad (8)$$

3. RESULTS OF SIMULATION

The simulation results for the model of figure 1 with the values that were described to the variable flow, state and associated parameters show the graphs (figures 3, 4 y 5) generated by the program VENSIM for state variables RBMP, INV and Q at a time horizon of 180 days.

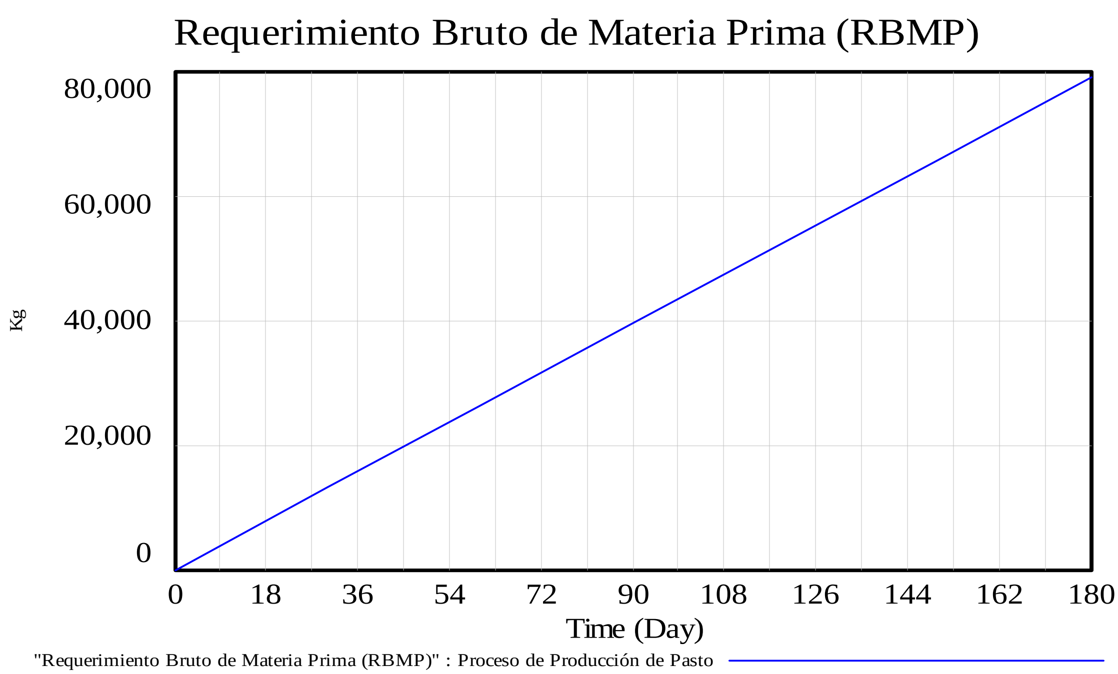

Figure 3. Graphic evolution of the state variable of feedstock Requerimiento Gross (RBMP). VENSIM simulation.

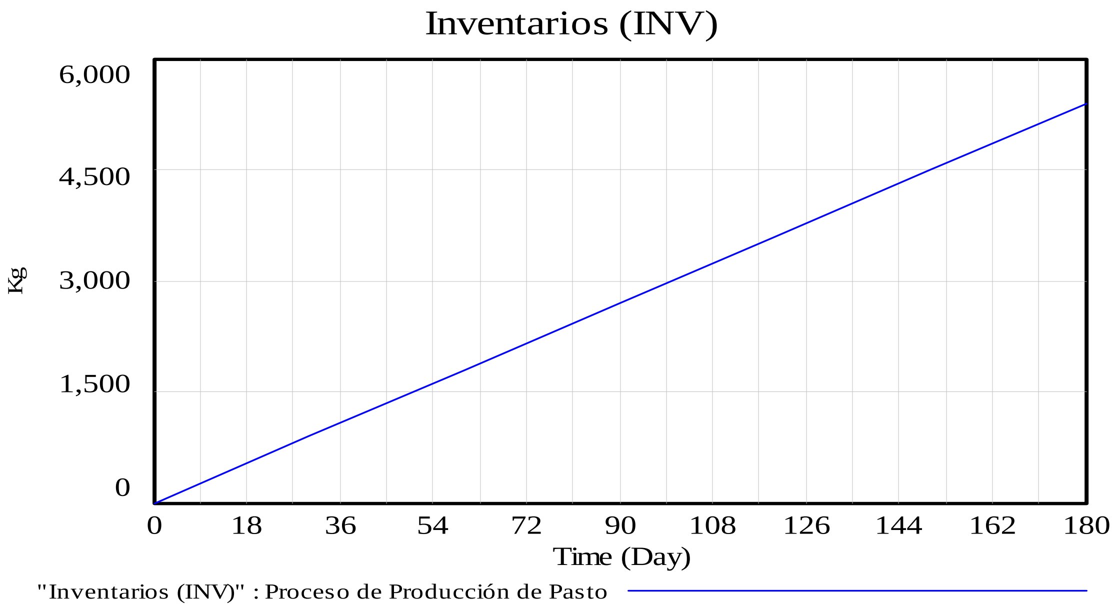

Figure 4. Graphic evolution of the state variable Inventory (INV). VENSIM simulation

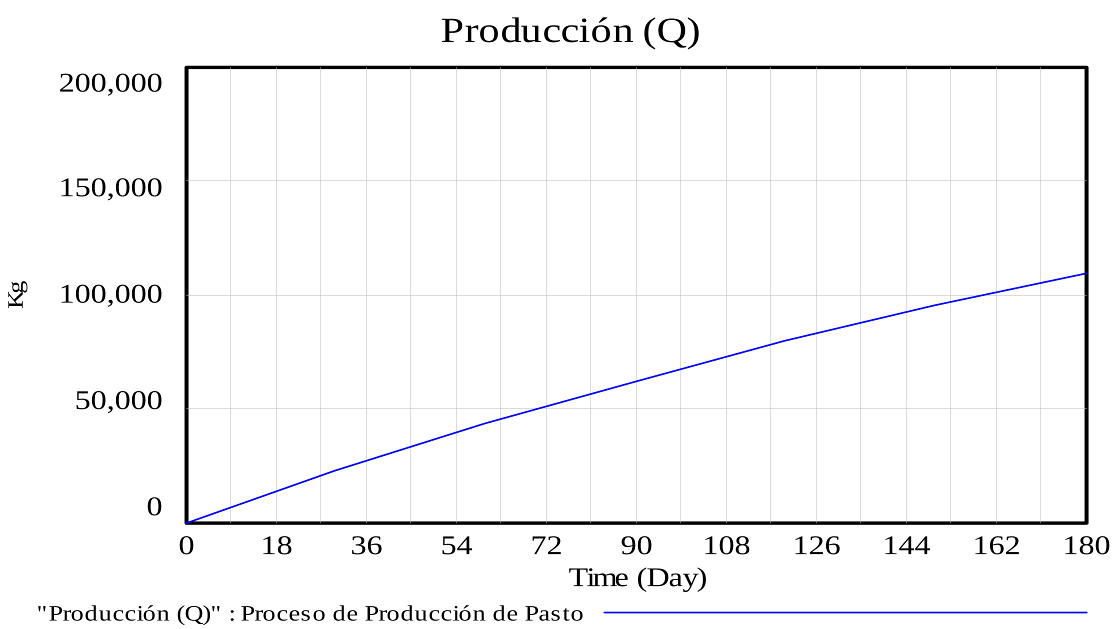

Figure 5. Graphic evolution of the state variable of production (Q). VENSIM simulation.

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