



TECHNICAL UNIVERSITY OF NORTH

FACULTY OF ENGINEERING APPLIED SCIENCE

MECHATRONICS ENGINEERING CAREER

TECHNICAL REPORT

SUBJECT:

**OVEN COOKED FOR PROCESSING
AVIAN BLOOD SHED FOR "LA COMARCA"**

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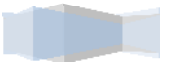
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Ibarra-Ecuador

2012

CONTENT

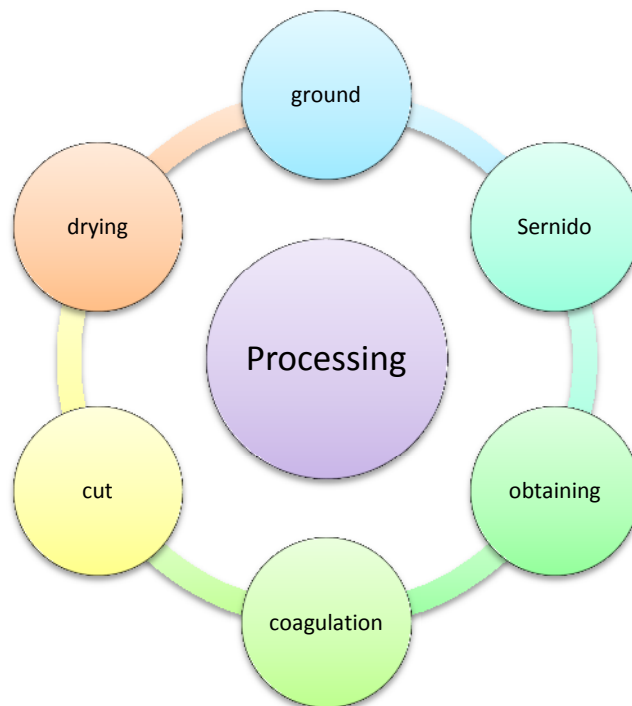
Chapter 1:	4	Introduction Process
	4	Treatment of raw material
	5	The process of transforming raw materials
Chapter 2:	6	System Parts
	6	Drying Oven
	7	Electronic Components
	9	Stage Control
	11	Parameters of Drying Oven
	12	Description of Drying Oven
	13	Production Capacity Drying Oven
Chapter 3:	15	Process Automation
	16	Power Subsystem
	17	Process Description Diagram
Chapter 4:	24	Methods and Process
	24	Treatments
	27	Feasibility of the Blood Meal
	28	Experimental Design
	33	Results and Analysis
	33	Weight Average Weekly
	42	Interpretation of Assessment Tables Weight
	43	Behavioral Treatment
	51	Annexes



CHAPTER 1: OVERVIEW OF THE PROCESS

Treatment of the raw material

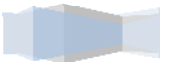
The preparation by this method of application by drying in an oven automated, comprising the following steps: Collecting and Preserving, Coagulation, pressing, drying, cooling and grinding.



- In the above scheme shows the steps of processing the raw material from slaughter plant, where the meat by-products will be treated and processed until the final product (blood meal).

- Generally apply different sub processes to organic products, until their respective recycling, but not detailed ways to assess your application to protein yield and poultry production.

- The raw material is processed and transformed in different ways to obtain a dried material for later use in a worm from mill grinds flour for a right consistency.



- One of the essential steps of processing the raw material (avian blood) is that of drying, which uses a tool based on a gas furnace for the production of dried blood croquettes until processing and flour milling Blood.

Process Description of raw material processing

Collection and preservation

Blood must be approved by the animal health control, hygienic collection. It can also be used between two and three day safter slaughter.

Coagulation

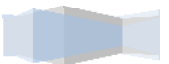
Can be used for this purpose any oil tank, cut longitudinally, the blood is heated above the water, previously subjected to boiling, stirring constantly until it becomes a black mass, must be avoided because of this char so no can use the resource, but one must consider that the blood has to boil 40 to 60minutes to perform the complete coagulation and destroy any pathogen.

Drying

Two procedures may be used to dry the blood, on mats spread on cement slabs outdoors, weather permitting, or in a drying oven trays. Clotted blood may be dried and pressed efficiently if it is not very large quantities.

Grind

The process of grinding it can be done by a hammer crusher are the most accessible in the market, and will conclude on screening processed with a sheet of 5 mm will suffice for this purpose.



CHAPTER 2: PARTS OF THE SYSTEM

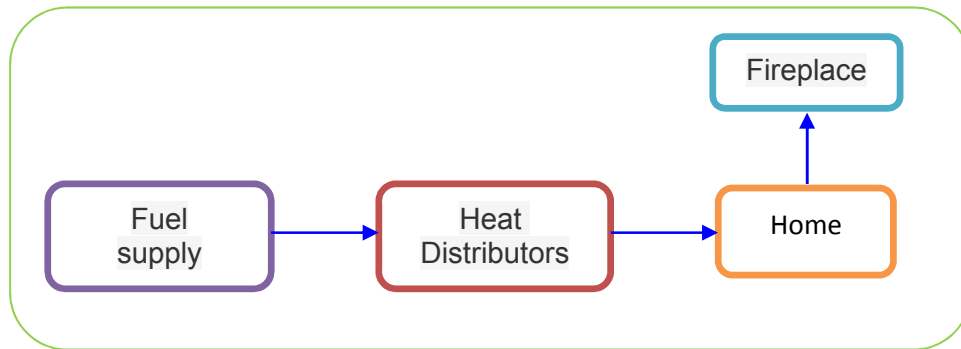
Drying Oven

A gas oven is a device that generates heat and which keeps within a closed compartment. It is generally used for cooking, heating or drying different products. The gas oven heats up faster than the electric.

This type of furnace burners operated as type burners or flute, which guarantee the burning of a specific amount of fuel, which keeps the heat.

Parts of the gas drying oven

The key parts of a gas furnace are:

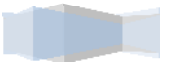


- A household or combustion chamber where fuel is burned, or in general is that house the burners and the combustion gases generated. You can match the heating chamber or be a separate chamber.

- heat exchangers consist of galvanized steel tubes, inside which circulates the gases at high temperatures yielding heat to the fluid that is inside or overheated steam or reheating. The main heat exchangers are economizers, screens or walls vaporizing water, super heaters and reheaters of steam.

- Ashtrays are the part of the bottom of the boiler which sets out the dross that will later be transported to a collection and storage silo are located at the bottom of the home. Its most common form is that of a truncated rectangular pyramid inverted.

- Chamber of warming: there are different types, depending on the shape of furnace operation and function.



- Roof insulation: covers all the cameras and equipment from the oven, preventing the spread of heat to the outside protection for people being in contact with the furnace, whereas its main function is to prevent heat loss.

ELECTRONIC COMPONENTS

It needs to analyze the variables (temperature, time, gas flow) to establish control of each of them so detailed you specify the correct components.

Temperature Control

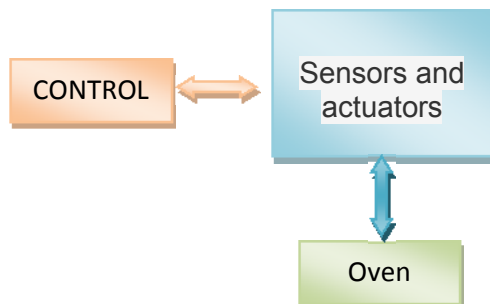
The how to keep the temperature in a gas oven baked for a treatment of blood, is the main address that we must look to carve out the controls that govern the behavior of temperature.

A temperature control system obtains the ambient temperature measured by a sensor, and this signal is treated, either digitally or analogously (depending on the type of control to be treated).

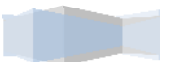
It then goes into a control system which enables, disables, increases or decreases the system to be responsible for maintaining the temperature. In the case of an oven, if the temperature is higher, the furnace power decrease, and if too low, increases this. Given reference input and the signal coming from the sensor.

Global System Process Furnace Operation

The overall type figured system



Block diagram of the system



The figure shows two stages, the control and sensors and actuators. Are contained in the first algorithm of the process, the generation of the registration and data acquisition unit, the second processing are counted and their respective circuits.

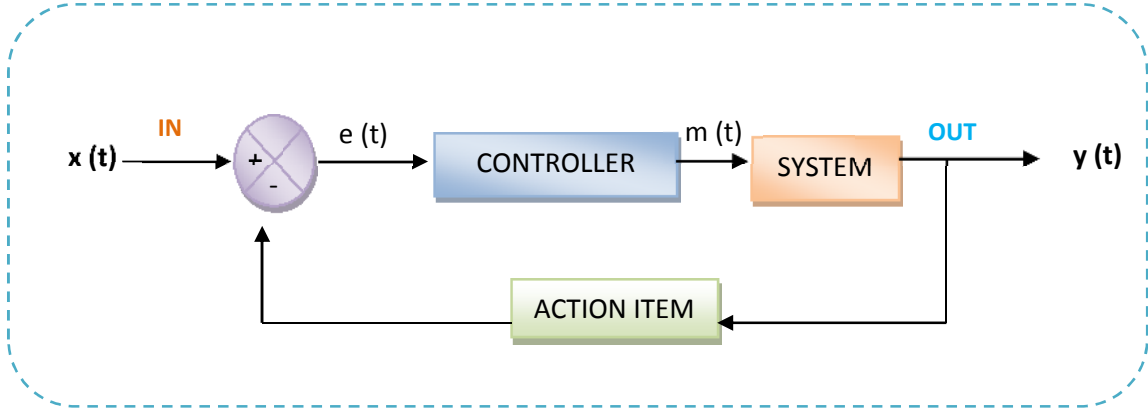
During the cooking, the temperature control is the most important factor for maintaining product quality.

The preservation of the product at the right temperature (25 °C) increase the life thereof, as appropriate temperatures decrease the rate of decomposition, reducing the rate of pathogens that may exist in the material.

Control phase

Control sets out measures to correct the activities, so that plans are achieved successfully. Quickly identifies and analyzes the causes that can cause deflections so as not to appear again in the future.

Provides information about the status of implementation of plans, serving as a basis to restart the planning process. Reduces costs and saves time by avoiding mistakes.



Process Control stage

Controller

A device driver is a medium that allows the operating system with a peripheral, possibly making a standardized interface to use.

Can be represented as an instruction manual that tells the operating system, how to control and communicate with a particular device.

There are many types of controllers such as types of peripherals; it is common to find a driver for the same device as possible, each offering a different level of functionality.

LOGO

LOGO is the universal logic module from Siemens has integrated

- Control
- Operating and display unit with backlight
- Power supply
- Interface for expansion modules
- Interface for programming module (card) and cable for PC
- Basic functions widely used pre-programmed, for example for connection delayed, delayed switch, relay socket, and switch software
- Timer
- Analog and digital brands
- Inputs and outputs depending on model.

With a framed LOGO tasks are solved in the art of installation and the home (eg stair lighting, outdoor lighting, awnings, blinds, lighting, display, etc..) And the construction of cabinets, machinery and equipment (eg door controls, ventilation, drinking water pumps, etc..).



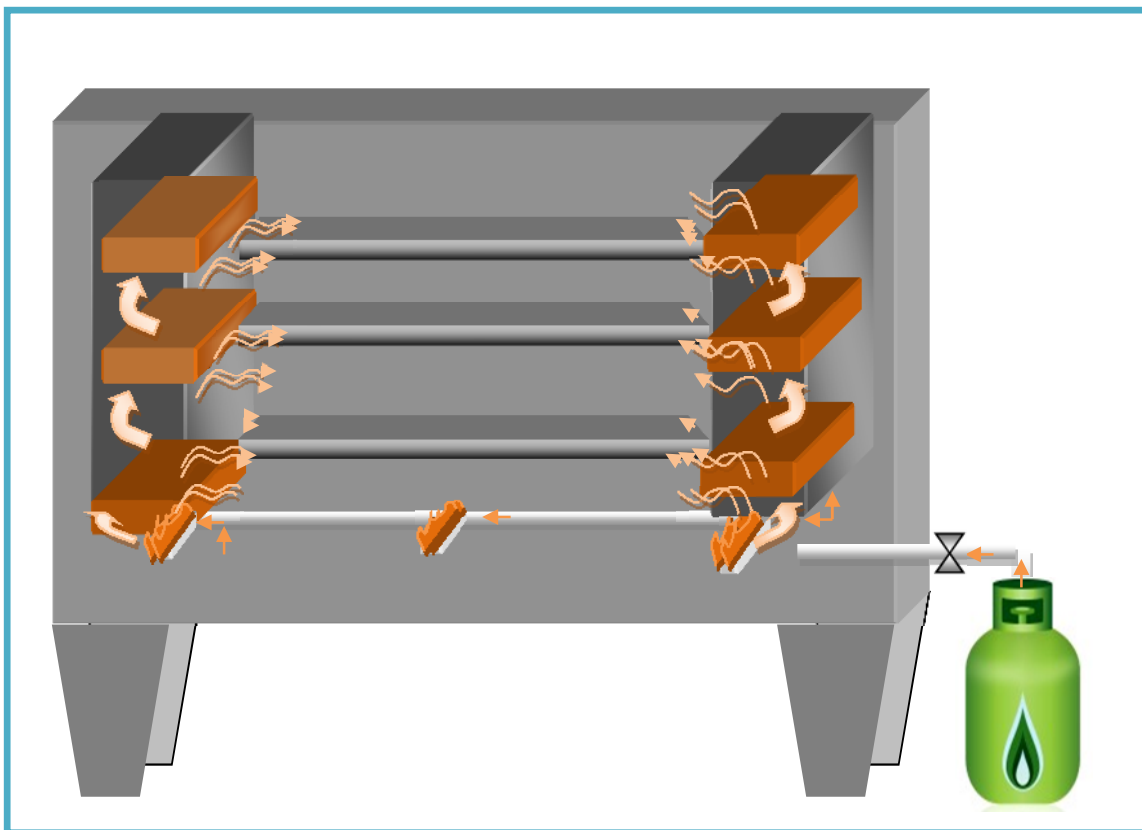
PARAMETERS OF DRYING OVEN

Building a Drying Oven

A drying oven gas is the facility where transforms chemical energy of fuel into heat which is used to increase the temperature of those materials deposited on the inside and so raise the state necessary for subsequent industrial processes.

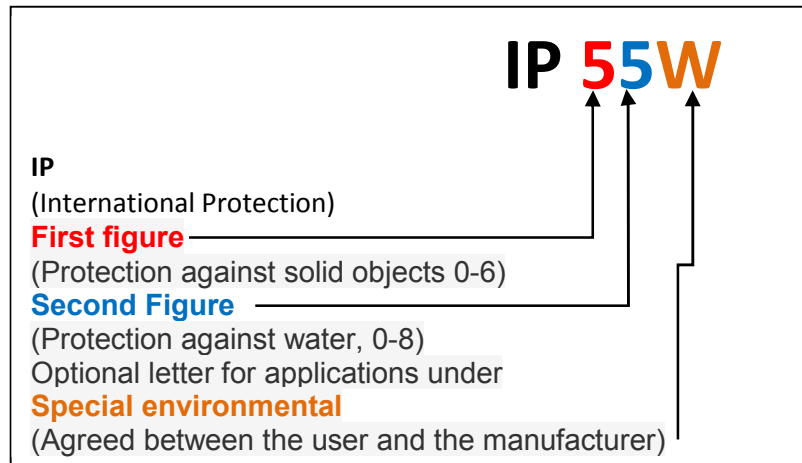
The desiccator resembles a comfortable base with trays containing the blood pressed. Hot air is blown through the trays and the material deposited therein, eliminating moisture slowly. To simplify operation, you should put the trays in a kind of wagon for easy transport to and from the dryer.

According to Moreno (2005), states that based on methodologies is passed hot air oven walls by means of heat sinks, allowing even heat distribution to each of the different levels of the home.



Determining the IP Number

For the implementation and measurements were determined according to the appropriate IP number is detailed in the following chart:



Meaning of letters and numbers, IP rating

In the figure we note that the number efficient development of the treatment process with avian blood, because it has the characteristics of protection against dust, limited penetration (no harmful deposit), and protection against low pressure jets of water from all Limited entry directions and allowed.

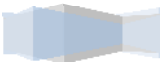
DESCRIPTION OF THE DRYING OVEN

The drying kiln versatile characterizations research presents the conditions of work which takes advantage of the spaces to give greater productivity and economy while preserving the traditional model of ovens for drying.

Meets the requirements of ISO 14001, which is the basis of environmental development, in determining the implementation of an EMS (Environmental Management System), consisting of processes covering the consecutive study of electrical warnings, improvement of sub-commodity, gas consumption, determines the use of materials for industry.

Through research and operating ranges should be developed in an oven that works permissible temperature ranges (up to 300 ° C), eligible for this development application to the food products industry.

The forced draft is an excellent method to comply with environmental conditions to be implemented, and also allows combustion gases are expelled by aspiration achieved by a special fan, temperature resistant and aggressions of the components of smoke, and driven by the fire, whose career depends solely on the conditions of the facilities.



This system has the advantage of not requiring stack height, since the emissions are in large quantities, contributing to the cleaning site atmospheric.

In this way we can determine the variables as temperature and humidity, determine that the galvanized steel is effective to meet the needs of work, giving us the guide construction of the drying furnace, the base having the foundation of processes forced draft.

Production Capacity Drying Oven

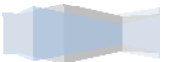
The capacity is directly related to the structural design of the drying oven, whereas the dimensions of both the home and trays allow us to the knowledge of the production capacity per process. It is also essential to analyze the raw materials and resources with which you work.

The raw material is obtained based on the monthly slaughter of 200 chickens with an average weight of 2.2 kg or 4.84 pounds each and should be averaged with 1 liter of blood faenada of which only 75% is usable, yielding 0.825 liters per bird, giving a total of 165litros for each process.

And in the case of not enough use of the resources of the slaughter of the shed, was taken as the secondary source EMRI (Enterprise Municipal Slaughter of Ibarra), which provides the amount needed for the processing of avian blood meal.

The production capacity of the drying furnace, is in the range of 60 pellets by the process, being produced in 2 hours, is performed once per week slaughtering, thereby producing an average of 240 pellets per shift in one month .

The size of the three trays allows placing the pellets in each tray 20 with a suitable dimensioning of 5cm wide and 8 cm long, and once the furnace heated to a temperature of 70 ° C the raw material to be completed in 1 hour and 20 minutes.



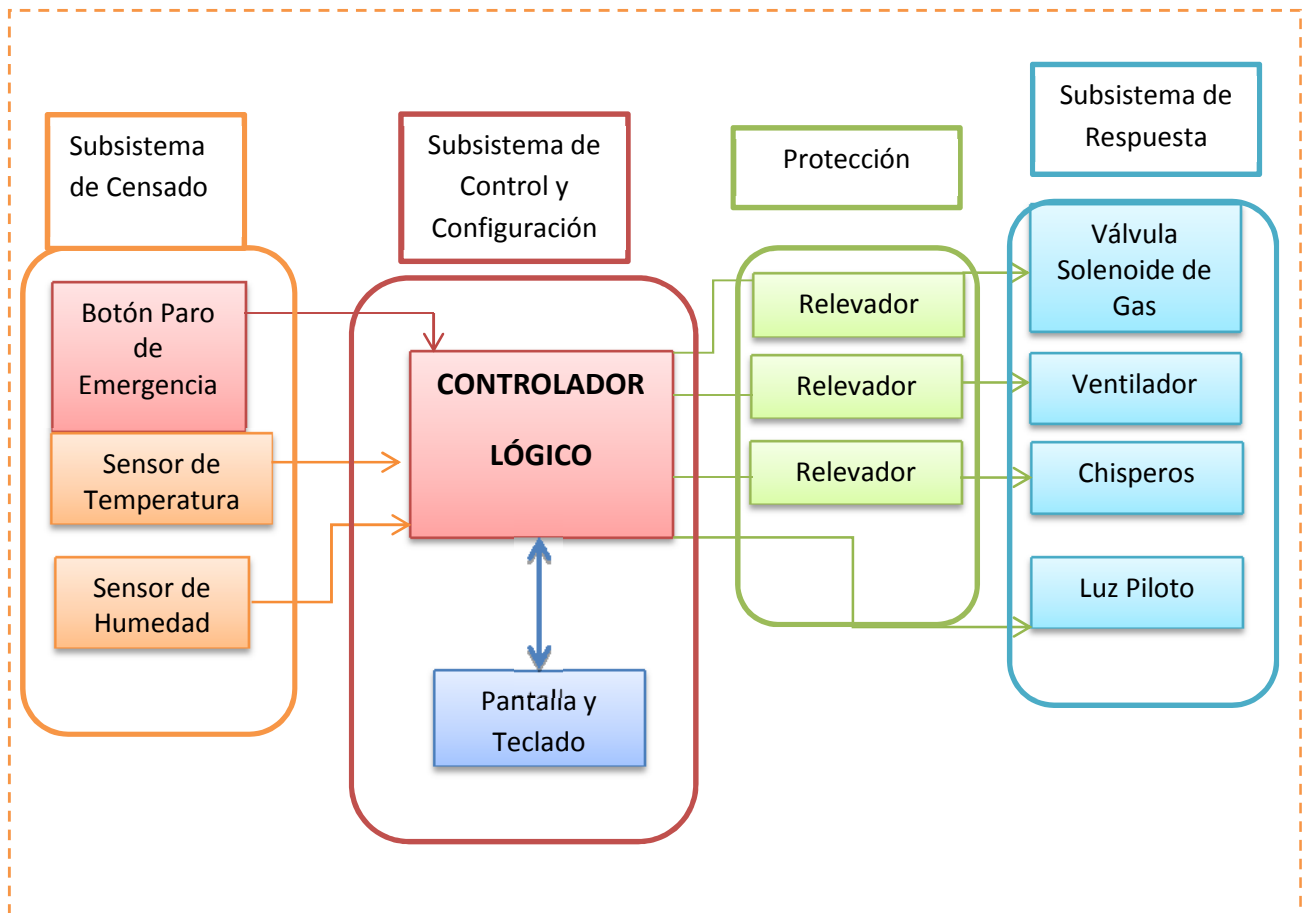
CHAPTER 3: Process Automation

APPROACH

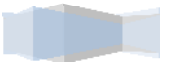
Block Diagram

Allows viewing and proper channeling of information by exposing the functioning of parts of the process, whereas the diagrams are relevant for a robust foundation of the analysis:

Block by block analysis of subsystems

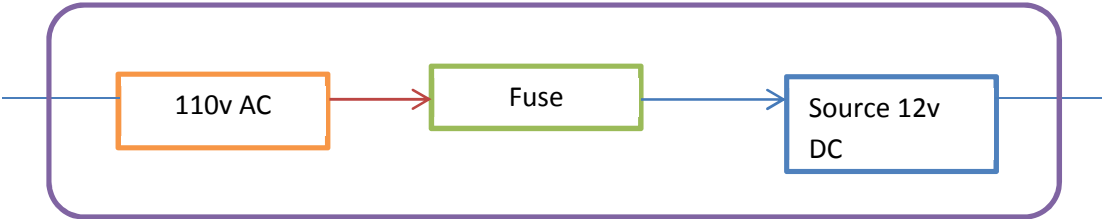


System Block Diagram



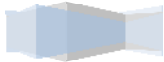
In the electronic control board will have different equipment and electrical and electronic elements that make the processing of croquettes blood is controlled, monitored for efficient performance in avian blood meal.

Power Subsystem



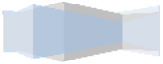
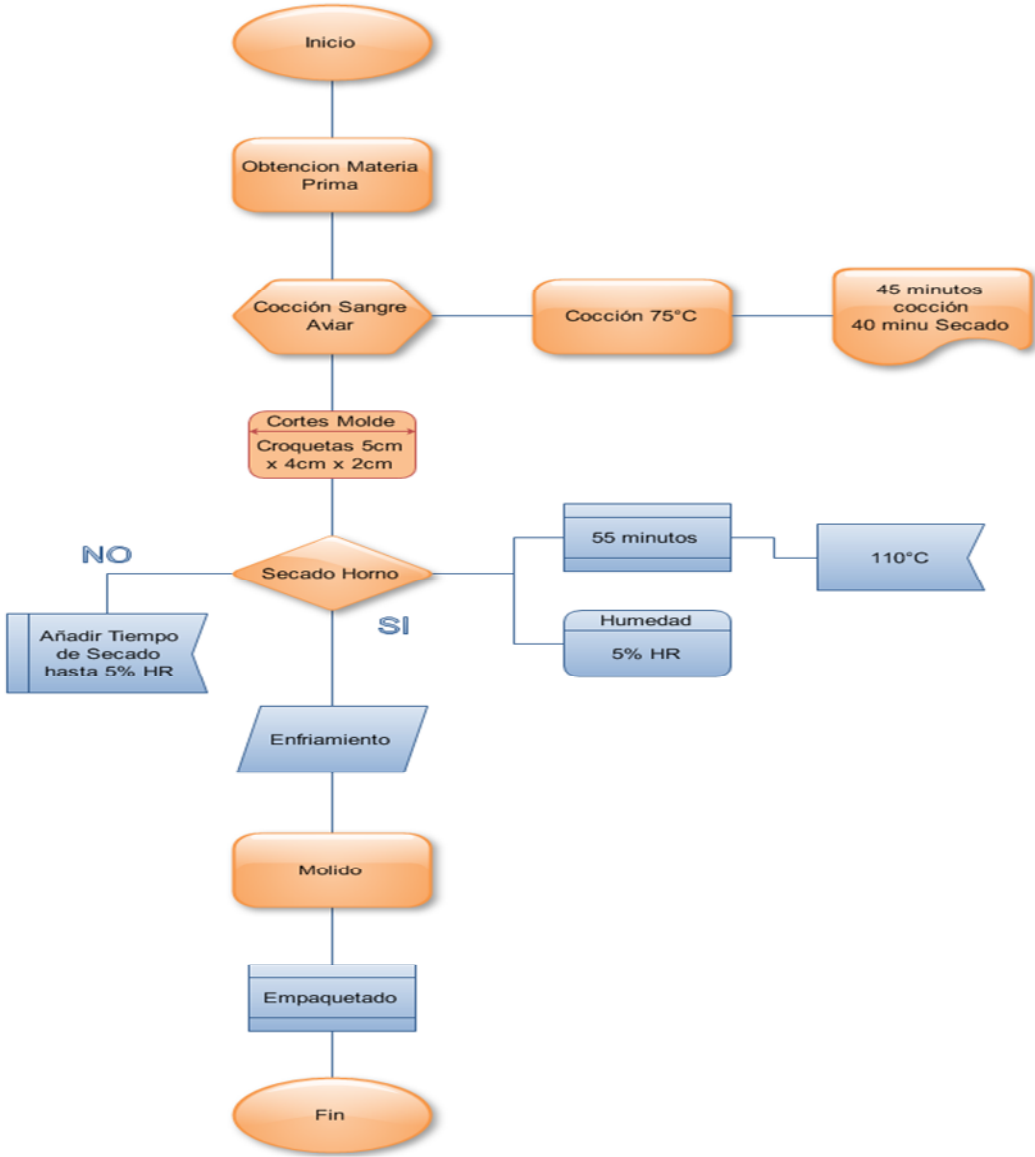
Block Diagram Power Subsystem

System power control processing is the basis for development of the project and that variables such as availability, malleability, and easy access to additional tools are completely different league linked to magnitudes that are offered in the Galpón “La Comarca”.

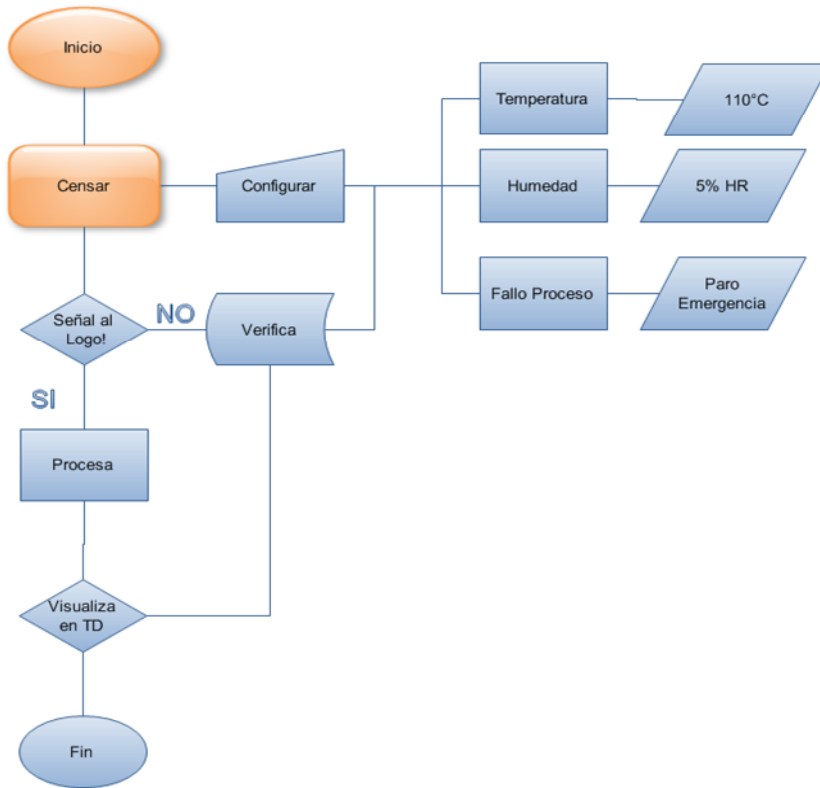


DESCRIPTION OF THE PROCESS

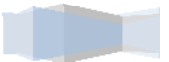
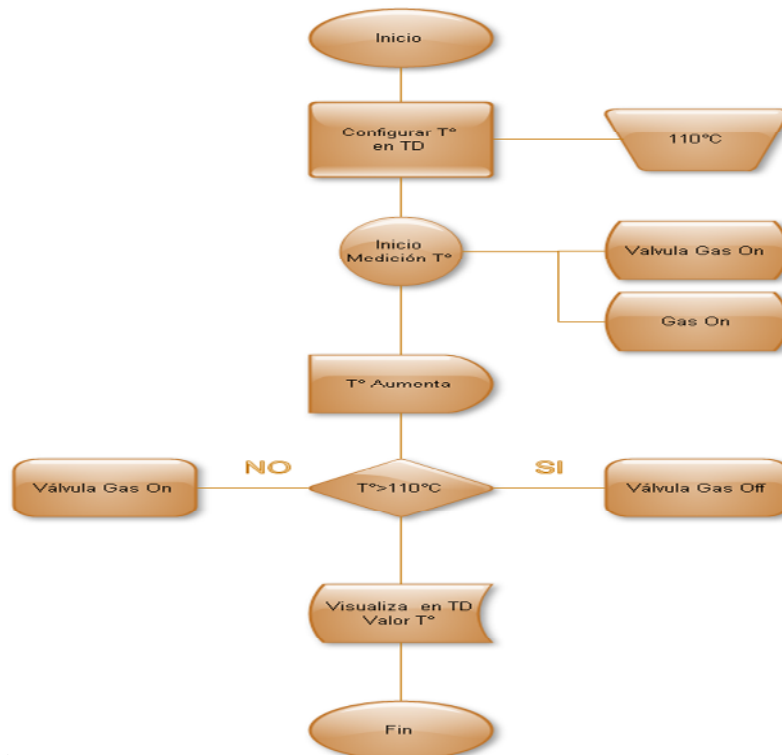
Flowchart Drying System



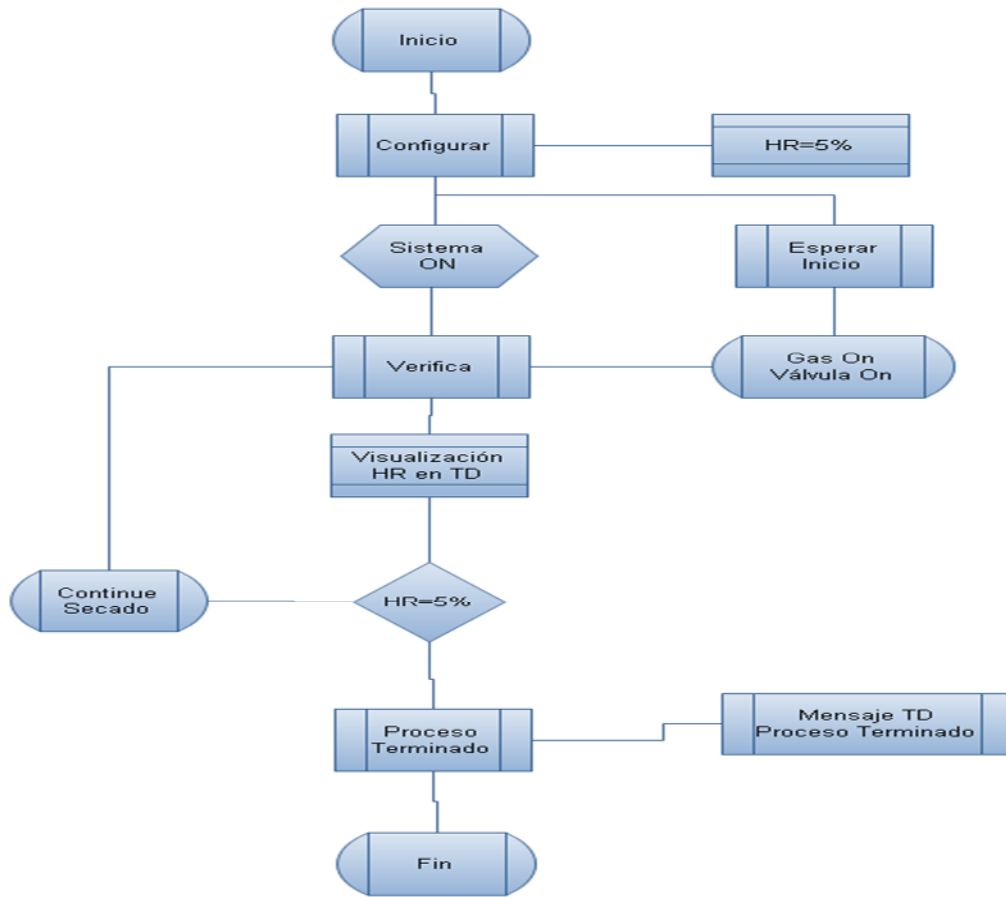
FLOWCHART SUBSYSTEM CENSUS



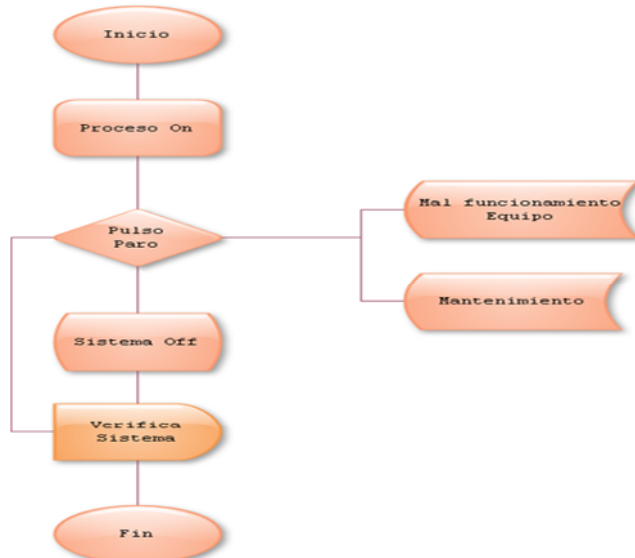
FLOWCHART SUBSYSTEM TEMPERATURE CENSUS



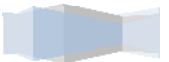
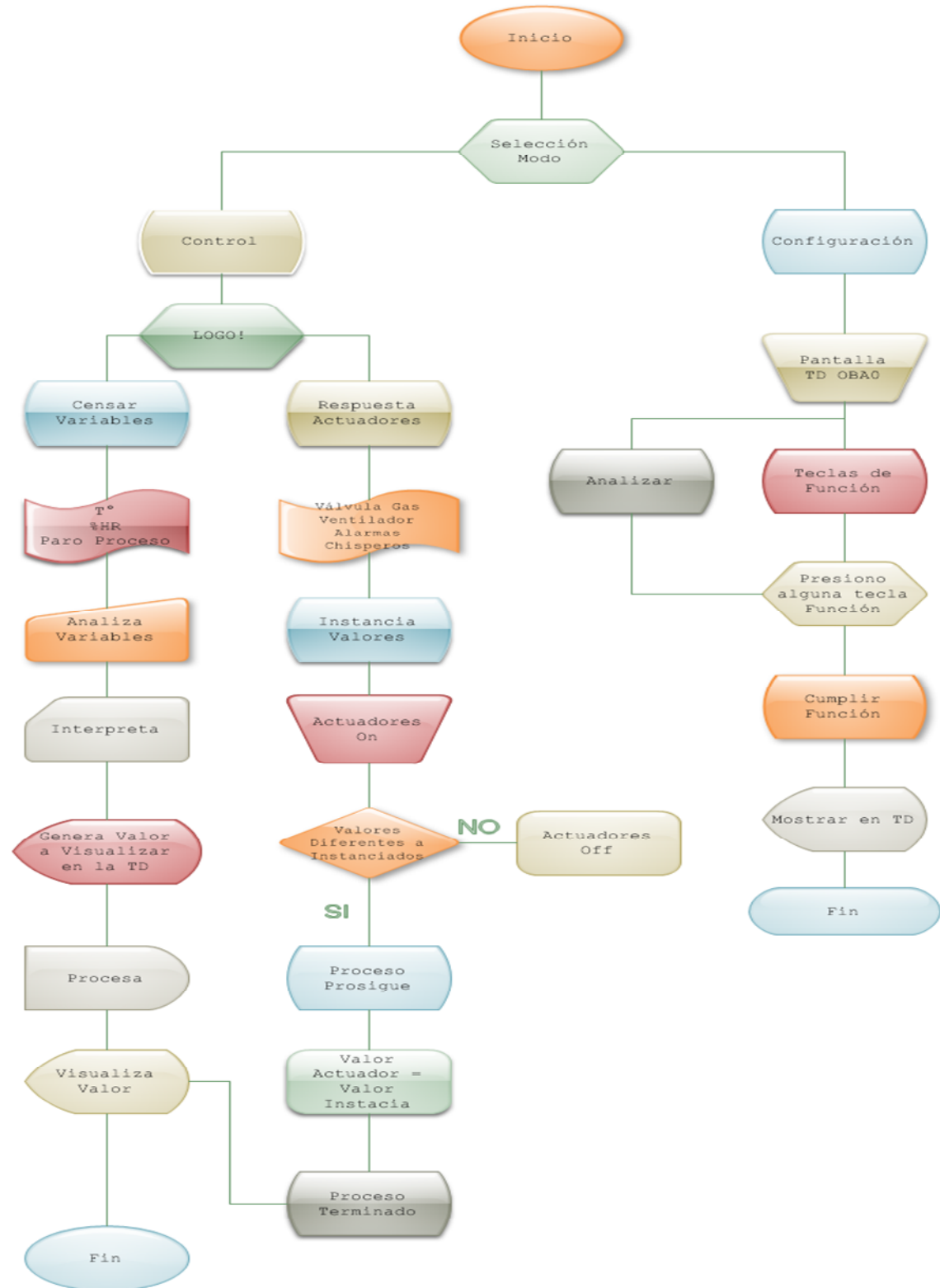
FLOWCHART SUBSYSTEM MOISTURE CENSUS



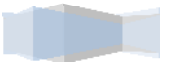
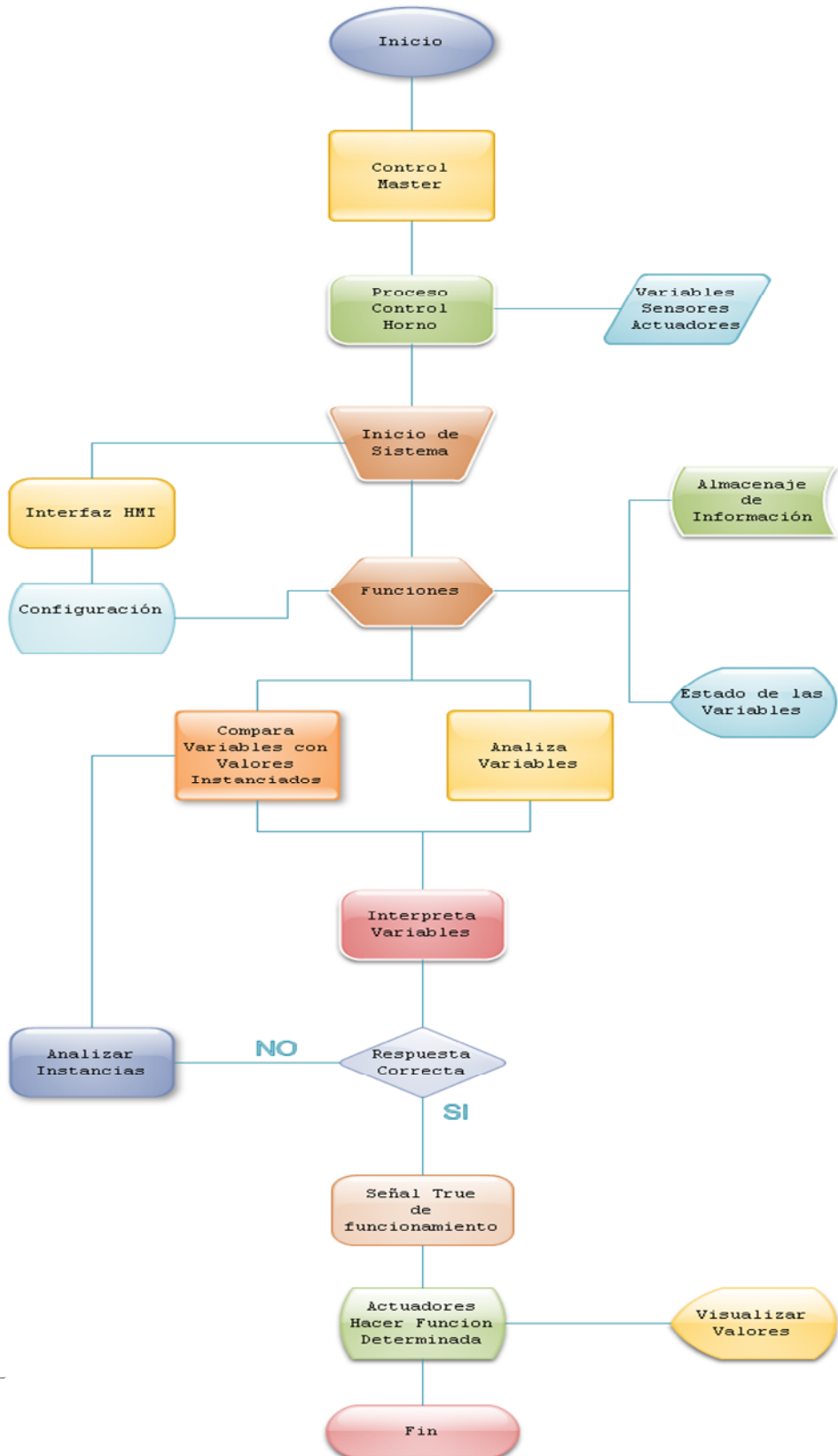
FLOWCHART SUBSYSTEM EMERGENCY STOP



FLOWCHART SUBSYSTEM CONTROL AND CONFIGURATION



FLOWCHART SUBSYSTEM LOGO



CHAPTER 4: METHODS AND TESTING

FACTORS IN STUDY

For the manufacture of blood meal is done by using a drying oven automatic tests should analyze their performance and behavior of the variables to be interpreted during processing of the product, whereas, we study three key variables which allow the correct development of production.

Drying Temperature: fundamental factor which depends on that of the correct instantiation for croquettes se4r when dried retain and improve their nutritional value and protein.
Humidity: essential indicator that processed kibble is at its optimum point of drying, which indicates that to obtain a range (%) will be defined for the better use of the pellets to form flour.

Drying time: necessary to obtain optimal processing of croquettes as if time is too short or you will not get a food with nutrients, so it must be instantiated as accurate as possible to avoid waste of raw materials whereas it saves energy and reduces production costs.

TREATMENTS

By having different factors under study, the basis is the combination of cooking and drying time.

These factors are very essential and rigorous line when configuring the processing requirements of avian blood croquettes, so has been given different types of treatments to achieve optimal treatment and satisfactory according to the needs of the product.

FACTOR		NUMBER	TREATMENT
a	b		
C1	S1	1	45 min cook en 2 hours drying
C1	S2	2	45 min cook en 3 hours drying
C1	S3	3	45 min cook en 4 hours drying
C2	S1	4	60 min cook en 2 hours drying
C2	S2	5	60 min cook en 3 hours drying
C2	S3	6	60 min cook en 4 hours drying
C3	S1	7	75 min cook en 2 hours drying
C3	S2	8	75 min cook en 3 hours drying
C3	S3	9	75 min cook en 4 hours drying



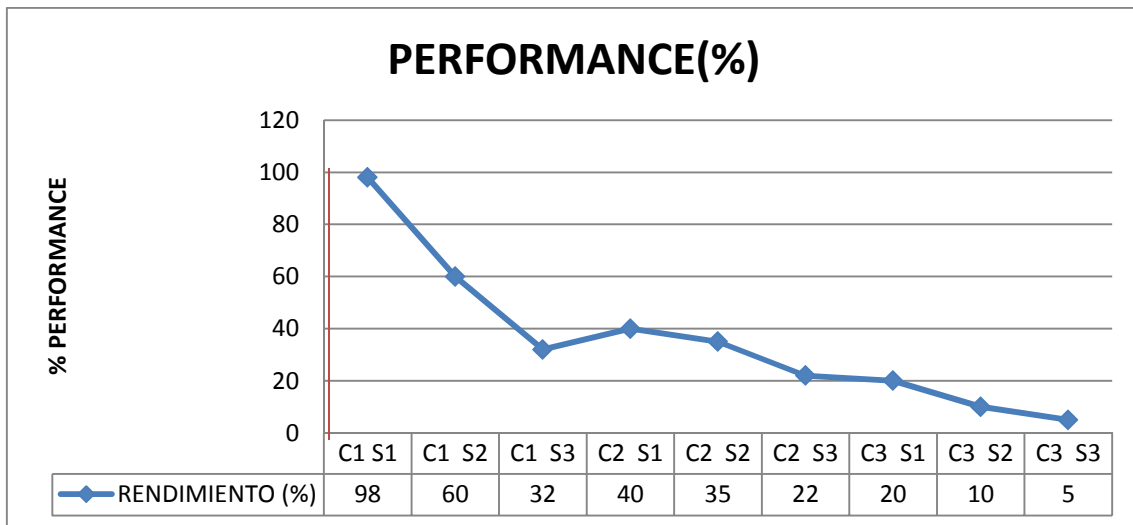
Nomenclature:

Factor a:	Cooking Time	Factor b:	Drying time
C1:	45 minutes	S1:	2 hours
C2:	60 minutes	S2:	3 hours
C3:	75 minutes	S3:	4 hours

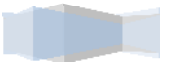
In conducting the performance analysis of the raw material according to the variables of the different treatments performed in the drying oven is concluded that the best performance, both material processed as saving resources, which details the process that C1S1el blood should be cooked 45 minutes and maintained for two hours in the drying process.

Furthermore, this process is clearly observed that the creation, color and presence of ash in the product is minimal, which is a deductive analysis that helps us to determine that the process is correct.

Seeing that is verified and found that the process is more efficient, to take contact with the furnace and the response of sensors and actuators analysis indicates that this treatment meets the standard test values is to have a drying temperature 110 ° C and reach a moisture content of 5% to make maximum use of the avian blood pellets.



Best Treatment to Apply



Raw materials needed in the blood meal

Protein.
Fiber.
Fat.
Humidity.

According to analyzes made croquettes, is determined that the best procedure is the C1S1, since the study was conducted in chemical laboratory, which gives us an answer of the components of each treatment with percentages indicating the presence of each component , which is attached to the verification.

Treatments Evaluated For the Balanced Feasibility

TREATMENTS AVAILABLE	
1	T0
2	T1
3	T2
4	T3
5	T4

Blood meal Treatment Feasibility

Nomenclature:

Treatment 0: Balanced trade.

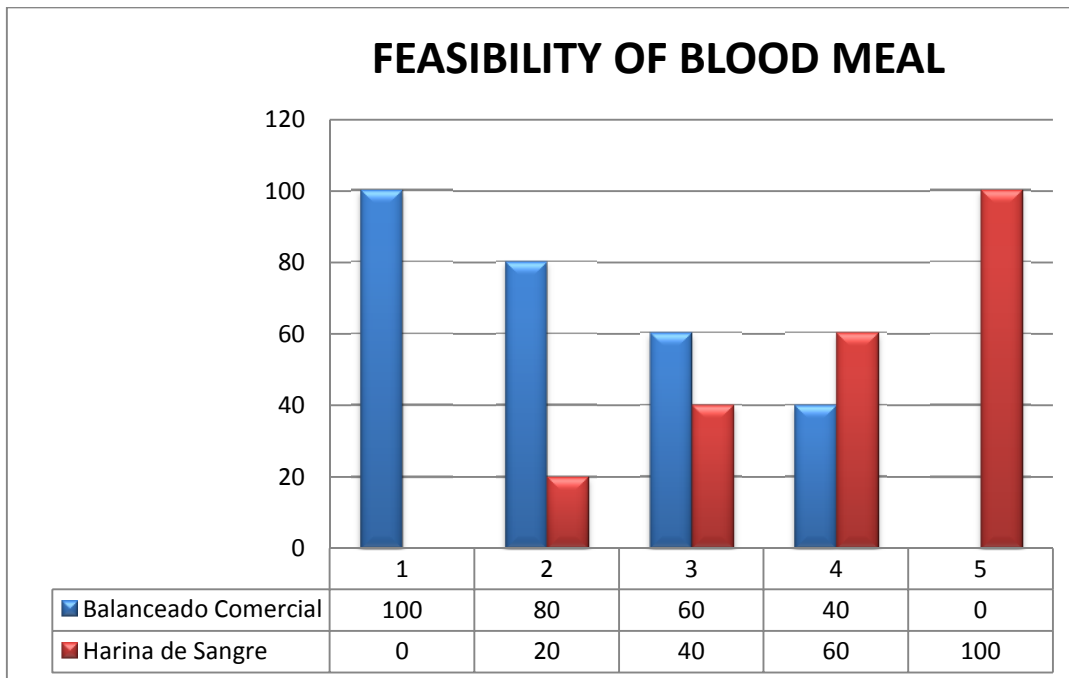
Treatment 1: Balanced formulated with a 20% replacement of blood meal.

Treatment 2: Balanced formulated with a 40% replacement of blood meal.

Treatment 3: Balanced formulated with 60% replacement of blood meal.

Treatment 4: Balanced formulated with a 100% replacement of blood meal.





Treatment Feasibility Food

Experimental Design

Type of design

The type of experimental design applied in this research project is structured such random but based on five treatments and proper repetitions, still requires at least two, so reliability was conducted for four.

Characterization of Experiments

Reps to perform: 4

Treatments: 5

Experimental unit: 10

Characteristics of the experimental unit: stood out as experimental basis a number of 10 chickens BB, the same age, race and weight, and 10 chickens comparative BB as those bred normally shed the Shire. To perform comparative analysis.



Outline of Analysis

SOURCE OF VARIATION	DEGREES OF FREEDOM
Total	15
Treatments	5
Experimental Error	10

Data Analysis

Functional Analysis

For optimum development, reliable and functional analysis, the analysis was developed based on the coefficient of variation, and in the case of evident differences that are relevant, apply the Tukey test, since it declares to us that two measures between treatments are significantly different, with the case study can be applied to 5% to avoid errors.

The Experiment Management

Data obtained and Evaluation Methods

To analyze the efficiency of blood meal in feed for poultry shed the experiment should be performed methods of assessment performance data to highlight the use of the product, whereas it should be analyzed:

Weekly weight gain

Feed conversion

Feed efficiency

Acceptability of meat, using the Friedman test

Weekly Weight Increase

We analyze the initial weight and its determination is based on each bird weighing, batch and repeat, hence the weighing should be performed once a week, whereas in the final stage determines the final average weight.

The weekly weight gain must be performed by performing the weighing of all birds according to the disposal of the treatments and repetitions, then determine the average weight of each.

The values of weekly weight gain and weight reference from the date of acquisition of chickens BB (day 1), are reflected in the table in Annex.



Food Conversion

This variable is essential and the consumption determined by the birds with feed of dry matter, based on the gradual increase in average weight exists.

This variable is evaluated to assess the performance of balanced prepared, which is determined by the following formula:

$$C.A = \frac{C.A.M.S}{I.M.P}$$

Nomenclature:

C.A = Food Conversion.

CAMS = Average consumption of food in dry matter.

I.M.P = Average increase in weight.

The study of food conversion is performed in order to check and see if the sample bone specimens taken as the basis of the experiment have internalized and accepted the proposal as a balanced blood meal.

The values of feed conversion are shown in Tables 2, we show the behavior of the bird when weight versus the average consumption of food giving us a clear conception of how it is working with the bird variables as a function of growth.

Feed efficiency

The efficiency and performance of the blood meal can be calculated using the following formulation:

$$E.A = \frac{Px}{C.A} \cdot 100$$

Nomenclature:

E.A = Efficiency of Food.

Px = Average weight of the bird.

C.A = Food Conversion.



The feed efficiency factor was taken into account in developing the process and step by step indicates the evolution and acceptance of performance that leaves the use of blood meal, giving us the best results based on the analysis of average weight poultry and feed conversion, the analysis in Table.

Acceptability of Meat

The focus of research should focus on the acceptability, to check the incidence of blood meal as factors such as taste or aroma.

Therefore in the analysis we used the Friedman test, as it applies to two factors in the parametric version, the method is to sort the data by rows or blocks, replacing them with their respective order. In sort, we must consider the existence of identical data.

The collaboration of a sample of tasters, helps verify the acceptability of the meat obtained by raising chickens with blood meal, it should be emphasized that prior to analysis people were instructed in sensory evaluation of meat to taste. Test was used and Table evaluator the last step of the project was carried out by the acceptance of the meat and gave reference to the treatment of birds sipping prepared and bred on the basis of blood meal, leaving you a great satisfaction with values found in the surveys, appreciating and project success.

Method for management of the experiment

Method of obtaining blood meal

It begins with the collection process from the slaughter of chickens shed the Shire, which must be placed on a previously clean container and properly sterilized, approximately 15 liters for each process used weekly.

From this it evaluates and characterizes the blood to the variables of baking and drying, having 4 repetitions of 5 experiments, with each of the times raised, which results highlight based on proximal practiced, the optimum amount of protein and acceptable S1 treatment was C1 S1, they had a cooking time of 45 minutes and 2 hours of drying, in which a stability was reached between the factors necessary amount of protein required humidity.

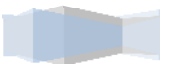
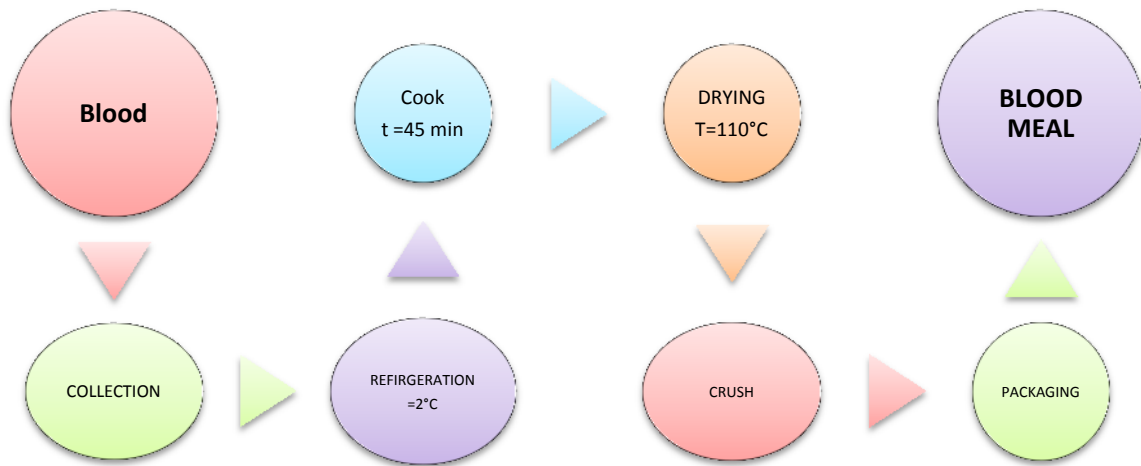


Diagram Preparation of blood meal



Process for Obtaining Blood Flour

Description of the Preparation Of Blood Meal

Blood obtained from chickens slaughtered in the Warehouse District

COLLECTION: We carried out in sterile plastic containers for the capacity of 15 liters.

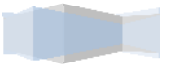
COOLING: recommended at $T = 2^{\circ}\text{C}$ partially.

COOKING: performed in water at boiling temperature is 92°C followed by bone attached blood and proceeds to measure the specific time of 45 minutes of cooking

DESIGN: Blood should be properly cooked according to the needs shape having a thickness of about 3 mm, 5 cm long and 8 cm wide, in line to expose the largest possible area for drying.

DRYING: the oven must reach a temperature of 70°C , as initial condition, must be worked in a standard 110°C , then threaded portions are located in the trays 3 and proceeds to parameterize the time of 2 hours.

CRUSH: it comes to proper grinding mill using a sieve artisanal 2 mm fine grain point.
ENPAQUETADO: was packed in polyethylene bags properly conditioned, non-transparent and hermetically sealed.



RESULTS AND ANALYSIS

The variables analyzed in the preparation of avian blood meal, are detailed in the following analysis with the data obtained in breeding birds shed the Shire, under the terms of treatments, schedules and requirements by which describe each:

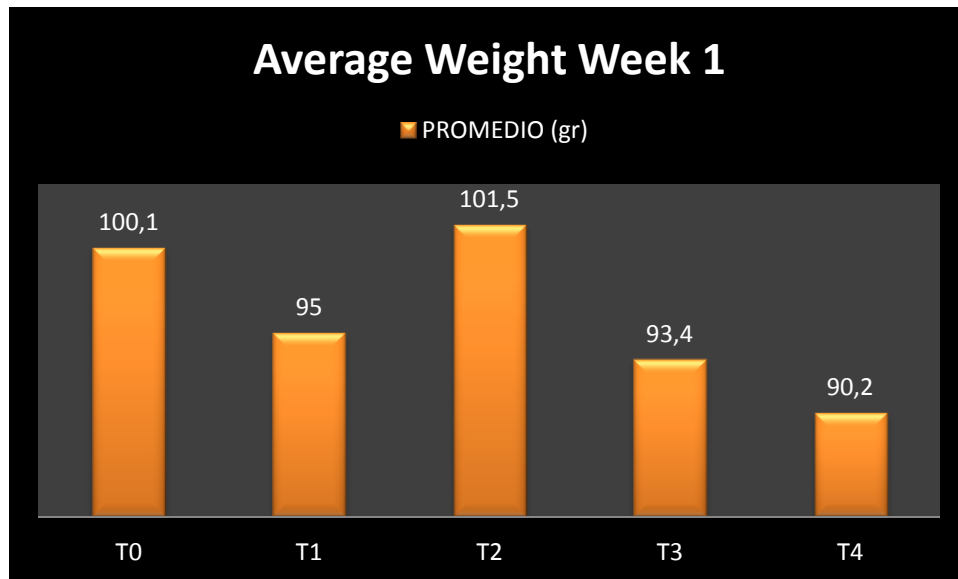
AVERAGE WEEKLY FEED

AVERAGE WEIGHT WEEK 1

The table shows us the different average weights obtained during the course of the First Week from T0 to T4 for the best treatment selection application.

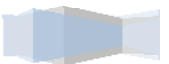
Treatments	Average (gr)
T0	100.1
T1	95
T2	101.5
T3	93.4
T4	90.2

Average Weight Week 1



Average Weight Analysis First Week

The following shows the values of average weight of the first week of the sample, which can analyzer that the best treatments are the T2 with a weight of 101.5 grams and 100.1 grams with T0.



TREATMENTS	Nº DATA	AVERAGE	RANK
T4	5	90,2	B
T3	5	93,4	B
T1	5	95	MB
T0	5	100,1	S
T2	5	101,5	S

Tukey test S1

Table is made at 5%, and we express that the control treatment and T2 are the treatments that have greater range of feasibility in terms of average weight in the birds tested during the first week.

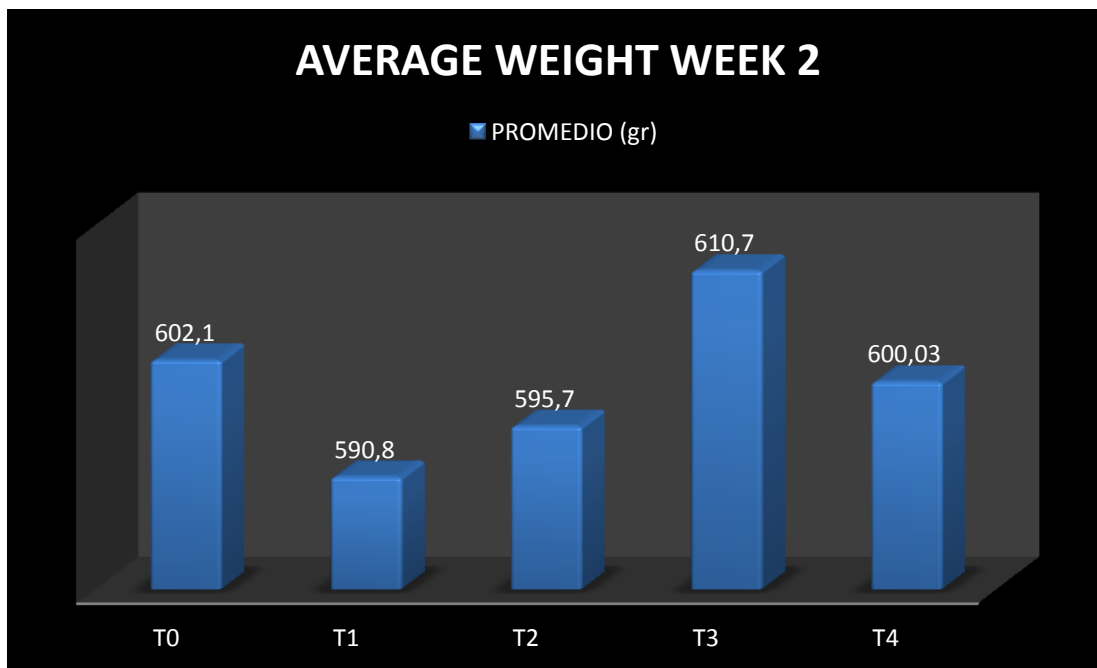
Average Weight Week 2

The table shows us the different average weights obtained during the course of the Second Week from the T0 to T4 for analyst the best treatment in the application.

TREATMENTS	AVERAGE (gr)
T0	602,1
T1	590,8
T2	595,7
T3	610,7
T4	600,03

Average Weight Second Week





Average Weight Analysis S2

The following table shows the values of average weight of the second week of the sample, which we emphasize that the best treatments are the T3 with 610.7 grams and 602.1 grams with T0.

TREATMENTS	Nº DATA	AVERAGE	RANK
T1	5	590,8	B
T2	5	595,7	B
T4	5	600,03	MB
T0	5	602,1	S
T3	5	610,7	S

Tukey test S2

Table is made of 5% and we expressed that treatment T0 and T3, are the best treatments that have greater range of acceptability and warranties as to the average weight for birds in the second week.

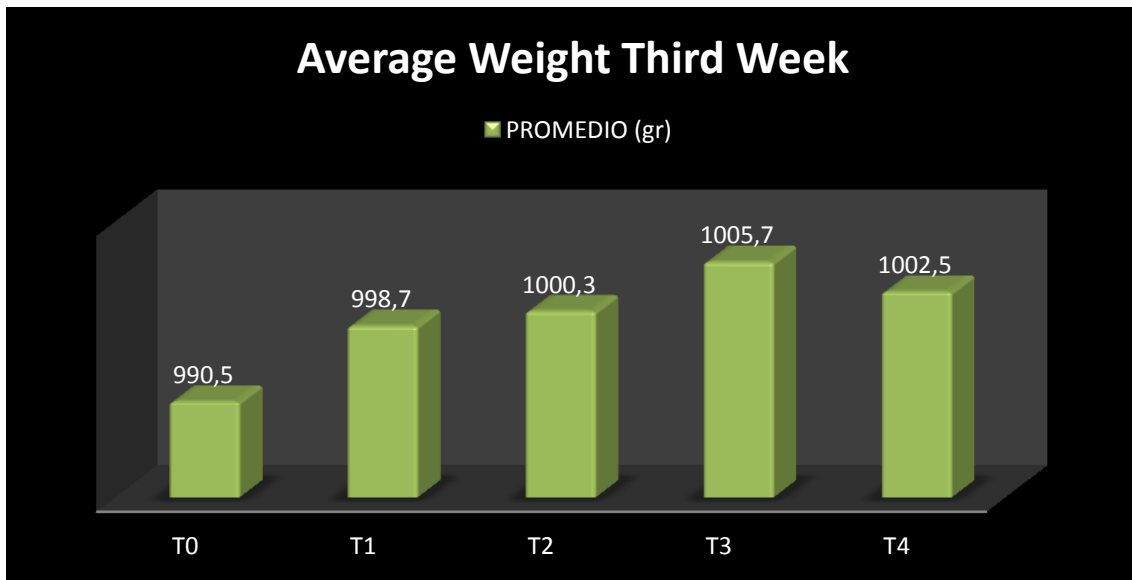
Average Weight Week 3

The table shows us the different average weights obtained during the course of the Third Week from the T0 to T4 for selecting the best treatment in the application.



TREATMENTS	AVERAGE (gr)
T0	990,5
T1	998,7
T2	1000,3
T3	1005,7
T4	1002,5

Average Weight Third Week



Average Weight analysis S3

The following shows the values of average weight of the third week of the sample, which we emphasize that the best treatments are the T3 and T4 1005.7 g 1002.5 g with.

TREATMENTS	Nº DATA	AVERAGE	RANK
T0	5	990,5	B
T1	5	998,7	B
T2	5	1000,3	MB
T4	5	1002,5	S
T3	5	1005,7	S

Tukey test S3



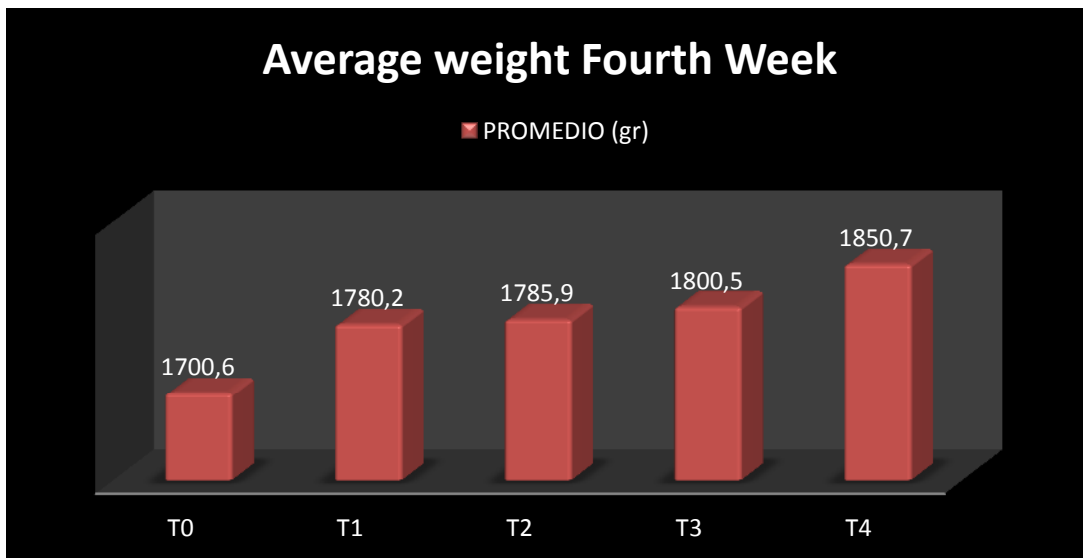
Table is made of 5% and we express to testing, states that the T4 t T3, are the best treatments that have been showing us senior weight gain by accepting blood meal.

Average Weight Week 4

The table shows us the different average weights obtained during the course of the Fourth Week from T0 to T4 and for selecting the best treatment option for the application.

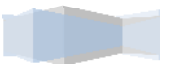
TREATMENTS	AVERAGE (gr)
T0	1700,6
T1	1780,2
T2	1785,9
T3	1800,5
T4	1850,7

Average weight Fourth Week



S4 Average Weight Analysis

The following table shows the values of average weight of the Fourth Week of the sample, which can analyst that the best treatments are the 1800.5 g T3, and T4 with 1850.7 g.



TREATMENTS	Nº DATA	AVERAGE	RANK
T0	5	1700,6	B
T1	5	1780,2	B
T2	5	1785,9	MB
T3	5	1800,5	S
T4	5	1850,7	S

Tukey test S4

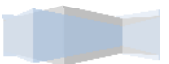
Table is made at 5%, and expresses when testing the T4 and T3, are the best treatments that have been approved, showing weight gain by accepting blood meal.

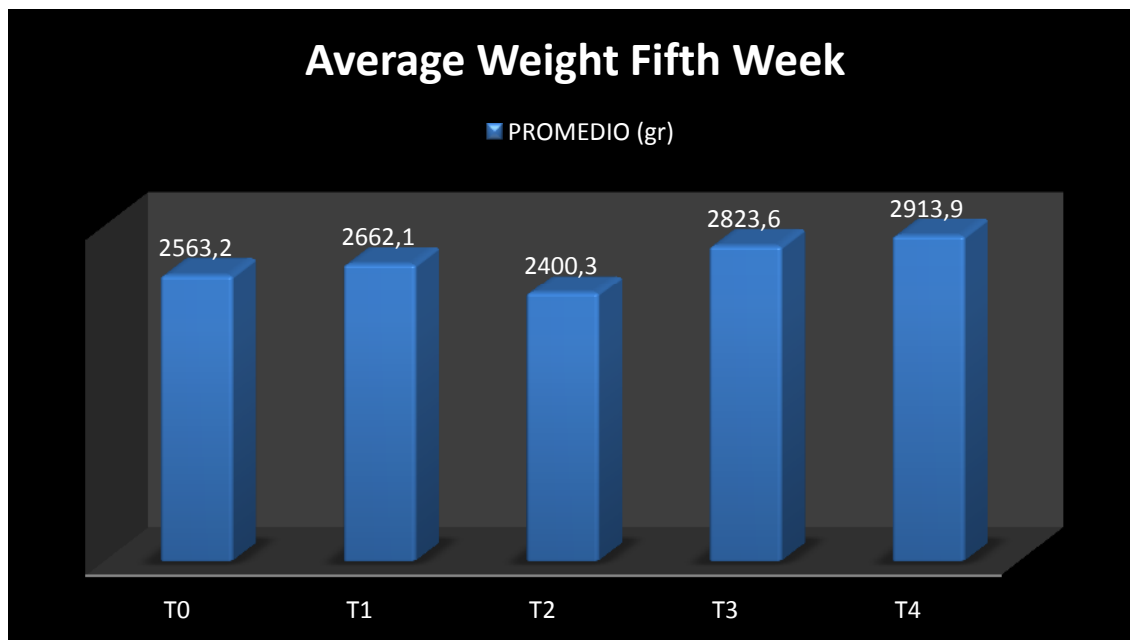
Average Weight Week 5

The table shows us the different average weights obtained during the course of the Fifth Week from the T0 to T4 for selecting the best treatment in the application.

TREATMENTS	AVERAGE (gr)
T0	2563,2
T1	2662,1
T2	2400,3
T3	2823,6
T4	2913,9

Average Weight Fifth Week





S5 Average Weight Analysis

The following table shows the values of average weight of the Fifth Week of the sample, which we emphasize that the best treatments are the T3 and T4 2823.6 g 2913.9 g with, and a decrease in the application of T2.

TREATMENTS	Nº DATA	AVERAGE	RANK
T2	5	2400,3	B
T0	5	2563,2	B
T1	5	2662,1	MB
T3	5	2823,6	S
T4	5	2913,9	S

Tukey test S5



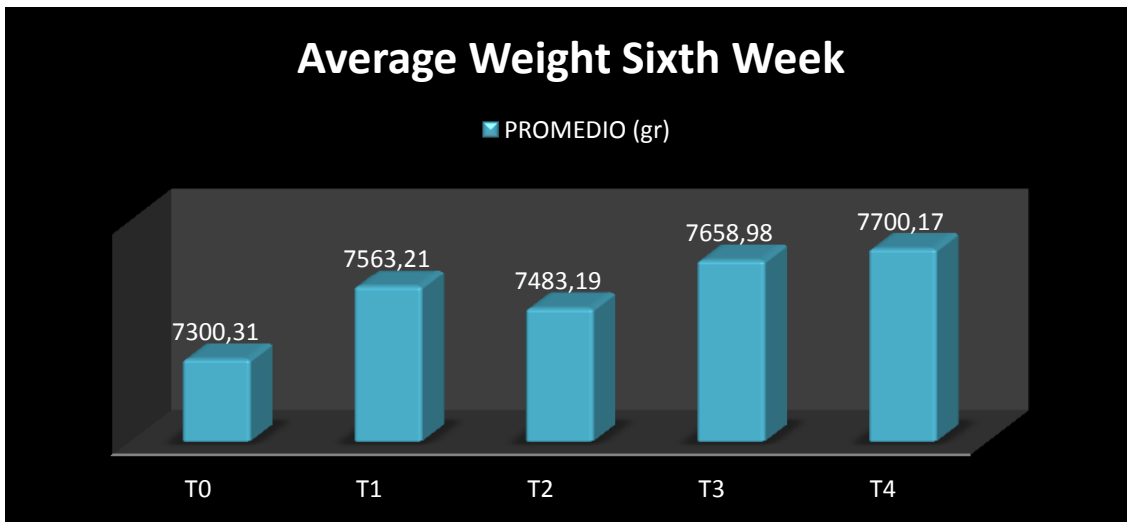
Table is made at 5%, and we express when testing the T4 and T3, are the best treatments that have been given approval, showing weight gain by accepting blood meal.

Average Weight Week 6

The table shows us the different average weights obtained during the course of the sixth week from the T0 to T4 for selecting the best treatment option for the application.

TREATMENTS	AVERAGE (gr)
T0	7300,31
T1	7563,21
T2	7483,19
T3	7658,98
T4	7700,17

Average Weight Sixth Week



S6 Average Weight Analysis

The Table shows the values of average weight for the last week of implementation, the sixth week of the sample with which we can realize that the best treatments of the process are the T4 with 7700.17 g equivalent to 16.94 lb, as well as a second best option we have the T3 application with 7658.98 g equivalent to 16.85 lbs.



TREATMENTS	Nº DATA	AVERAGE	RANK
T0	5	7300,31	B
T2	5	7483,19	B
T1	5	7563,21	MB
T3	5	7658,98	S
T4	5	7700,17	S

Tukey S6

Table is made at 5%, and we express when testing the T4 and T3, are the best treatments that have been approved, showing weight gain by accepting blood meal.

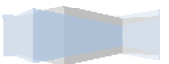
Interpreting Weight Tables

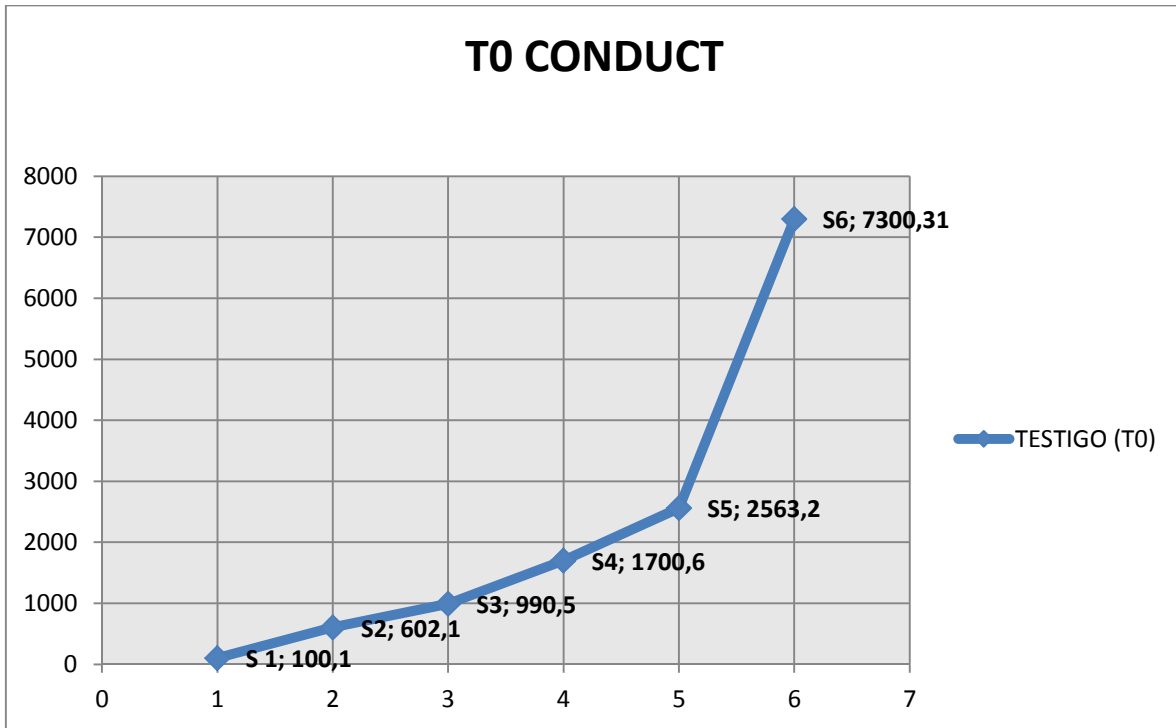
It gives us the information necessary to demonstrate that the better performance of the process it can be done by applying the T4 supply 100% through blood meal, which we obtain a better average weight of birds, and thus maximize resources.

WEEK	WITNESS (T0)	T1	T2	T3	T4
1	100,1	95	101,5	93,4	90,2
2	602,1	590,8	595,7	610,7	600,03
3	990,5	998,7	1000,3	1005,7	1002,5
4	1700,6	1780,2	1785,9	1800,5	1850,7
5	2563,2	2662,1	2400,3	2823,6	2913,9
6	7300,31	7563,21	7483,19	7658,98	7700,17

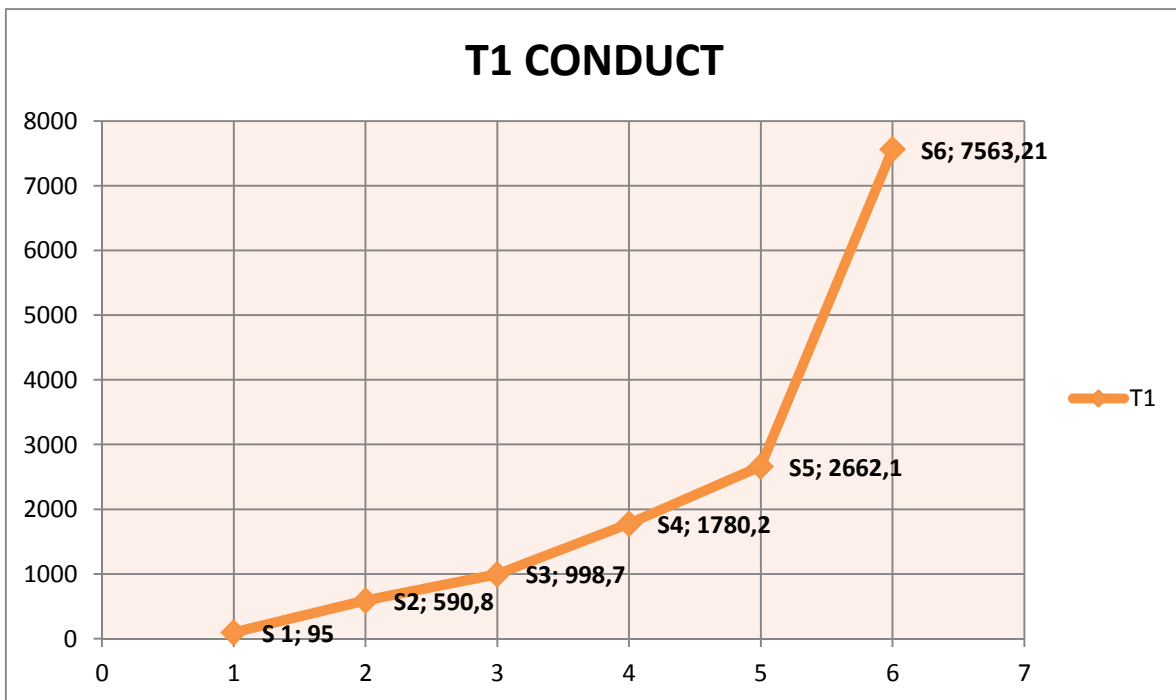
Cumulative Average Weights

The table presents the cumulative average weights, which is detailed the best treatment is the T4, with the implementation of 100% feeding of blood meal. Being optimal for processing and poultry feed.

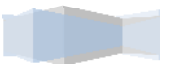


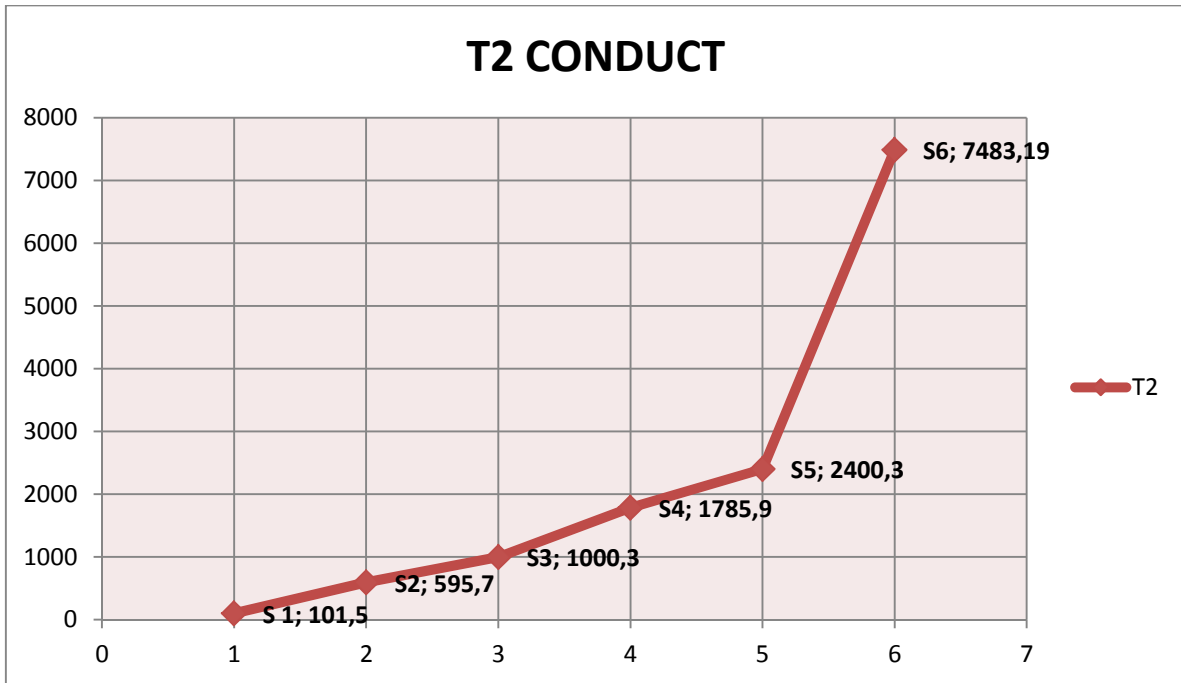


T0 behavior during the 6 weeks of implementation

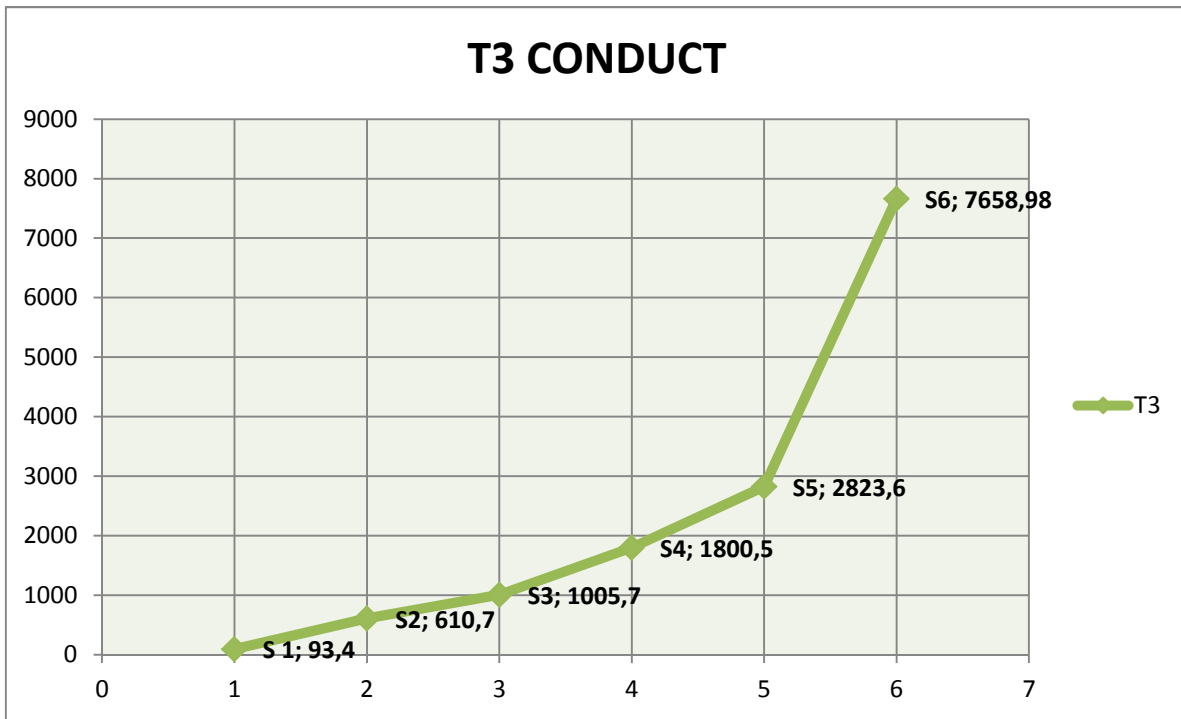


T1 behavior during the 6 weeks of implementation

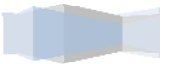


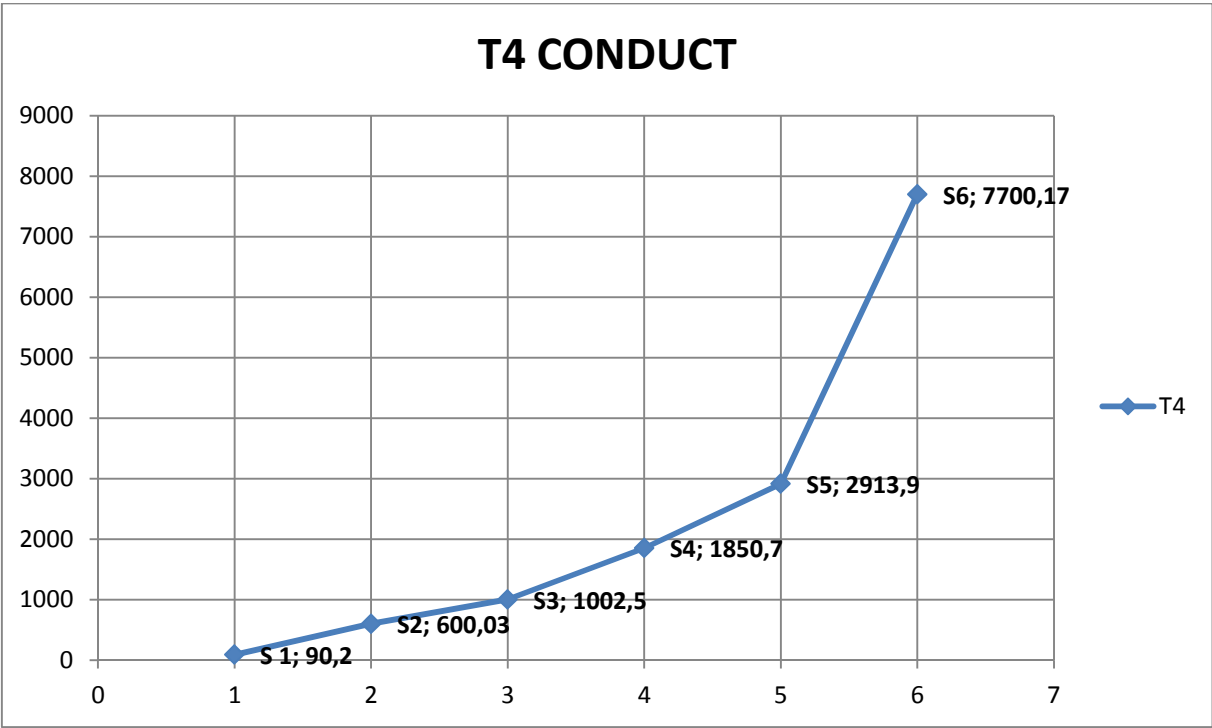


T2 behavior during the 6 weeks of implementation

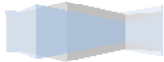


T3 behavior during the 6 weeks of implementation





T4 behavior during the 6 weeks of implementation

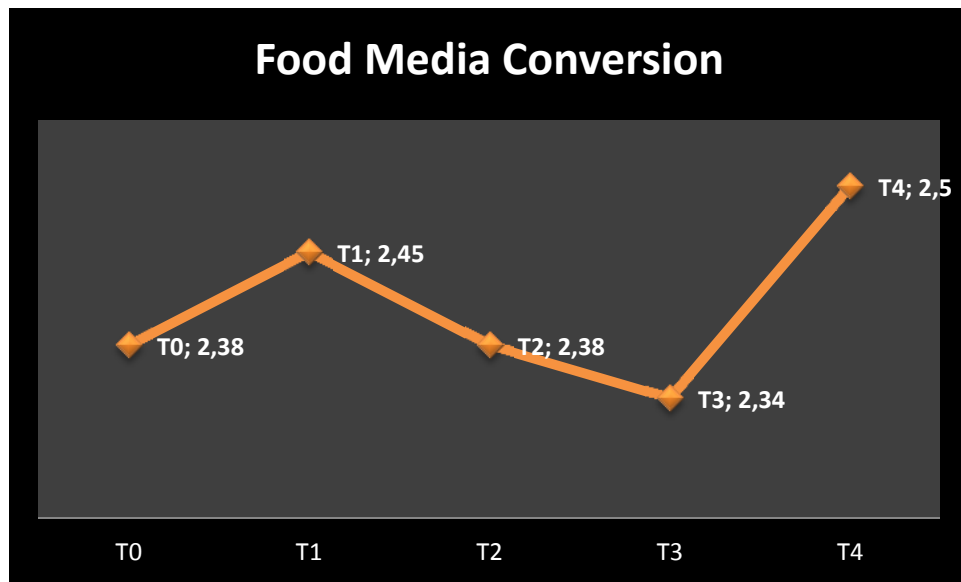


FOOD CONVERSION

In Table, we detail the data to see which is the best treatment in the process of obtaining avian blood meal

TREATMENTS	HALF
T0	2,38
T1	2,45
T2	2,38
T3	2,34
T4	2,5

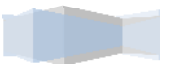
Food Media Conversion



Feed conversion behavior

Table shows that the T3 at the end of the process, bone Week 6, is the one with the lowest yield of feed conversion with a mean value of 2, 34.

What is clear is that this treatment reduced feed intake needed to produce 1000 g of body weight compared to other treatments.

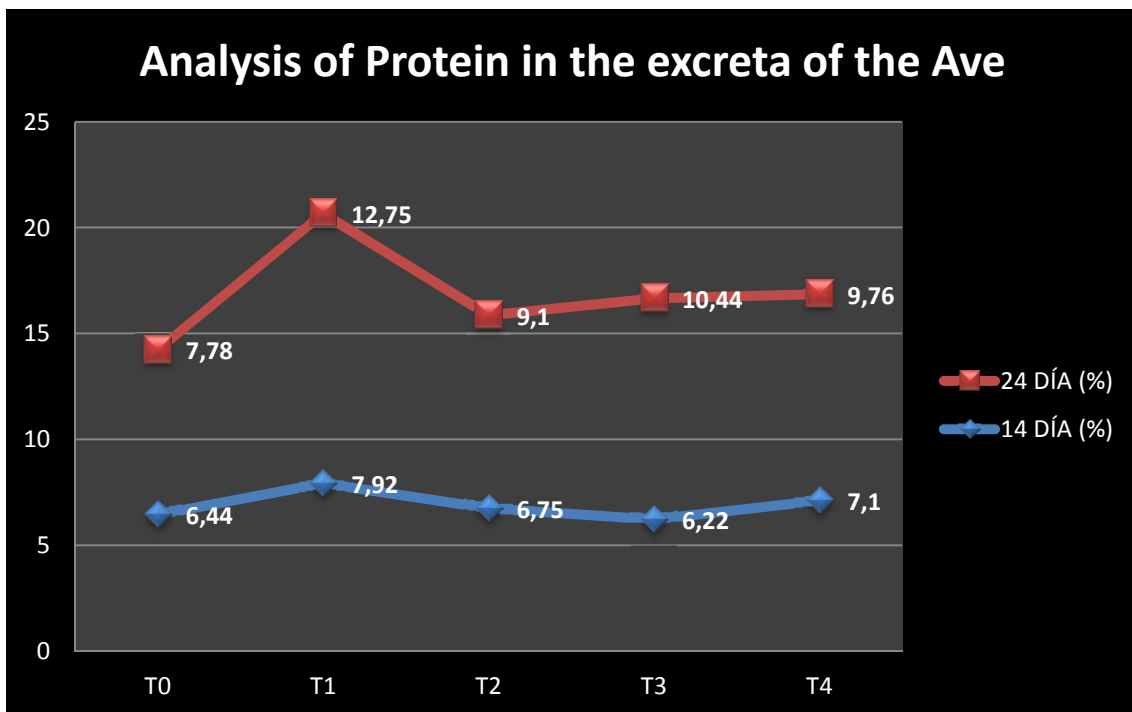


Apparent digestibility

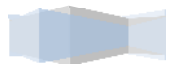
The key step is to investigate how the body assimilates the food of the bird as are the protein concentrations, and this is what was observed by analyzing the excreta of the bird in different stages of the process and was performed at 14 days and 42 days bone at week 6, which detail the results in the following table:

TREATMENTS	14 DAY (%)	24 DAY (%)
T0	6,44	7,78
T1	7,92	12,75
T2	6,75	9,1
T3	6,22	10,44
T4	7,1	9,76

Analysis of Protein in excreta Bird



Comparative Analysis of the protein at 14 and 42 days

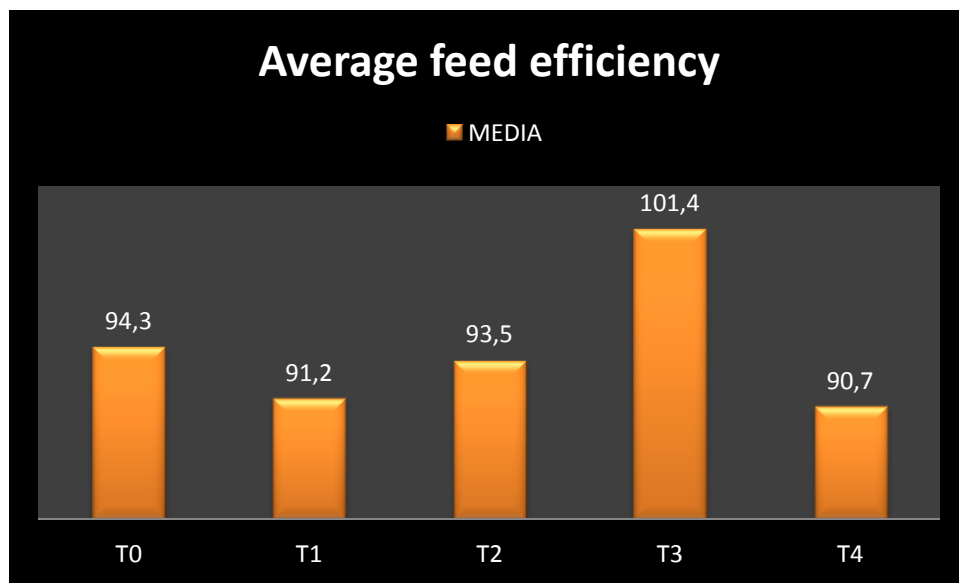


FOOD EFFICIENCY

Applying the formulas we get the Table No. 23, which highlights the efficiency percentage of each treatment to obtain better acceptance and profitability for the process.

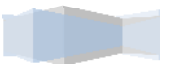
TREATMENTS	HALF
T0	94,3
T1	91,2
T2	93,5
T3	101,4
T4	90,7

Average feed efficiency



Analysis of the Average feed efficiency

We can see clearly that the best treatment is with a feed efficiency T3 Week 6 of 101.4% also highlights the T0 to 94.3%. Being the best treatments with high feed efficiency.

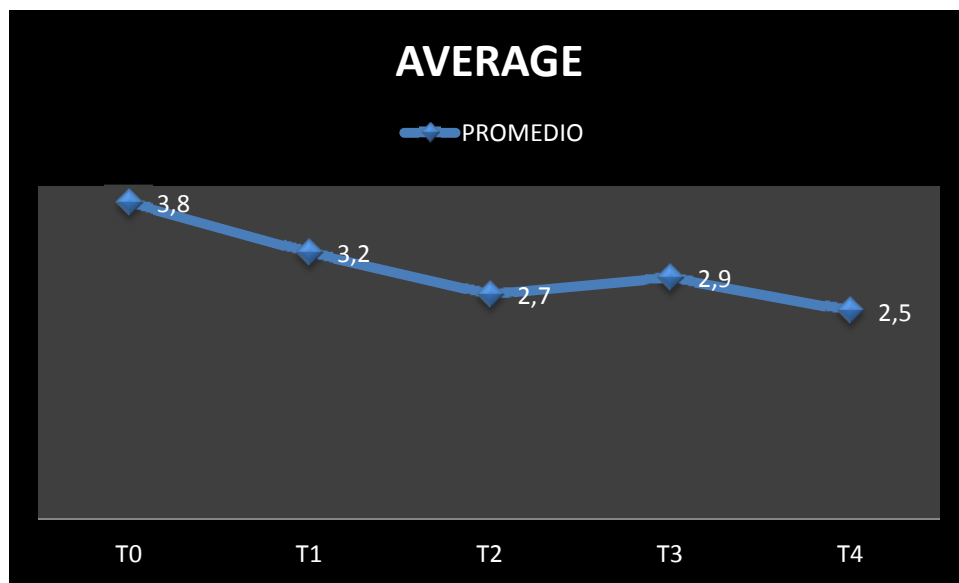


ACCEPTABILITY OF MEAT

It is the powerful symbol of the optimization of breeding and feeding birds (chickens), with avian blood meal, exposing how the meat is acceptable for human consumption.

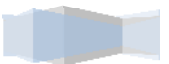
TREATMENTS	AVERAGE
T0	3,8
T1	3,2
T2	2,7
T3	2,9
T4	2,5

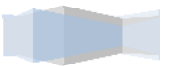
Average Acceptability of Meat



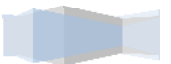
Average Analysis of Acceptability of Meat

In conducting the analysis of the averages obtained can realize that there is a working range of 2.5 to 3.8 of acceptability of the meat, being cataloged from soft to slightly soft flesh of the bird, which emphasized that the best T4 process has an average hardness of 2.5 equivalents to soft and very acceptable for human consumption.





ANNEXES



Ventilation system
Gas
(Fireplace)

Electronic
System

Gas Control
Valve



Heat sinks

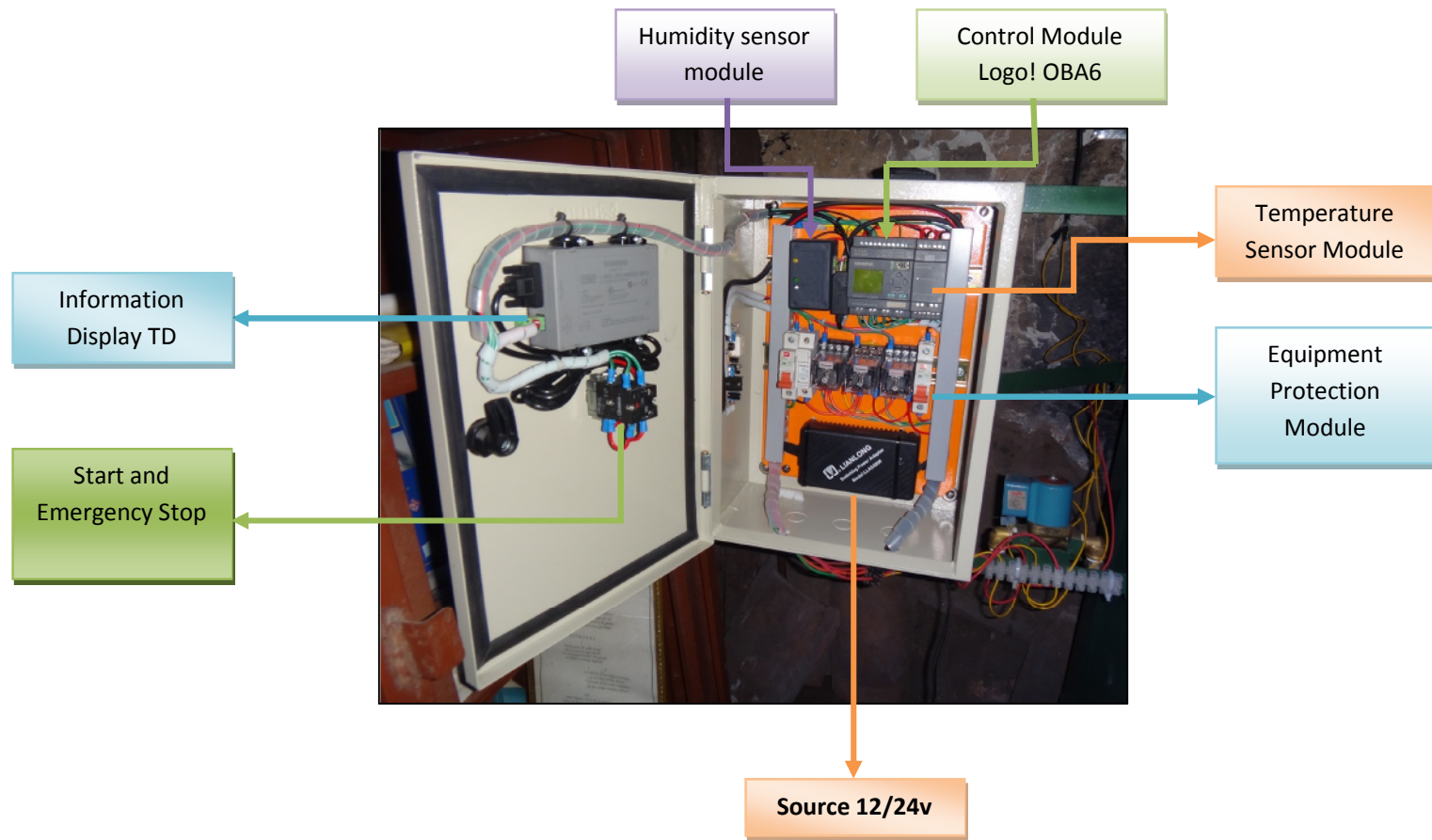
Raw material
trays

Viewers Gas
Flow Control

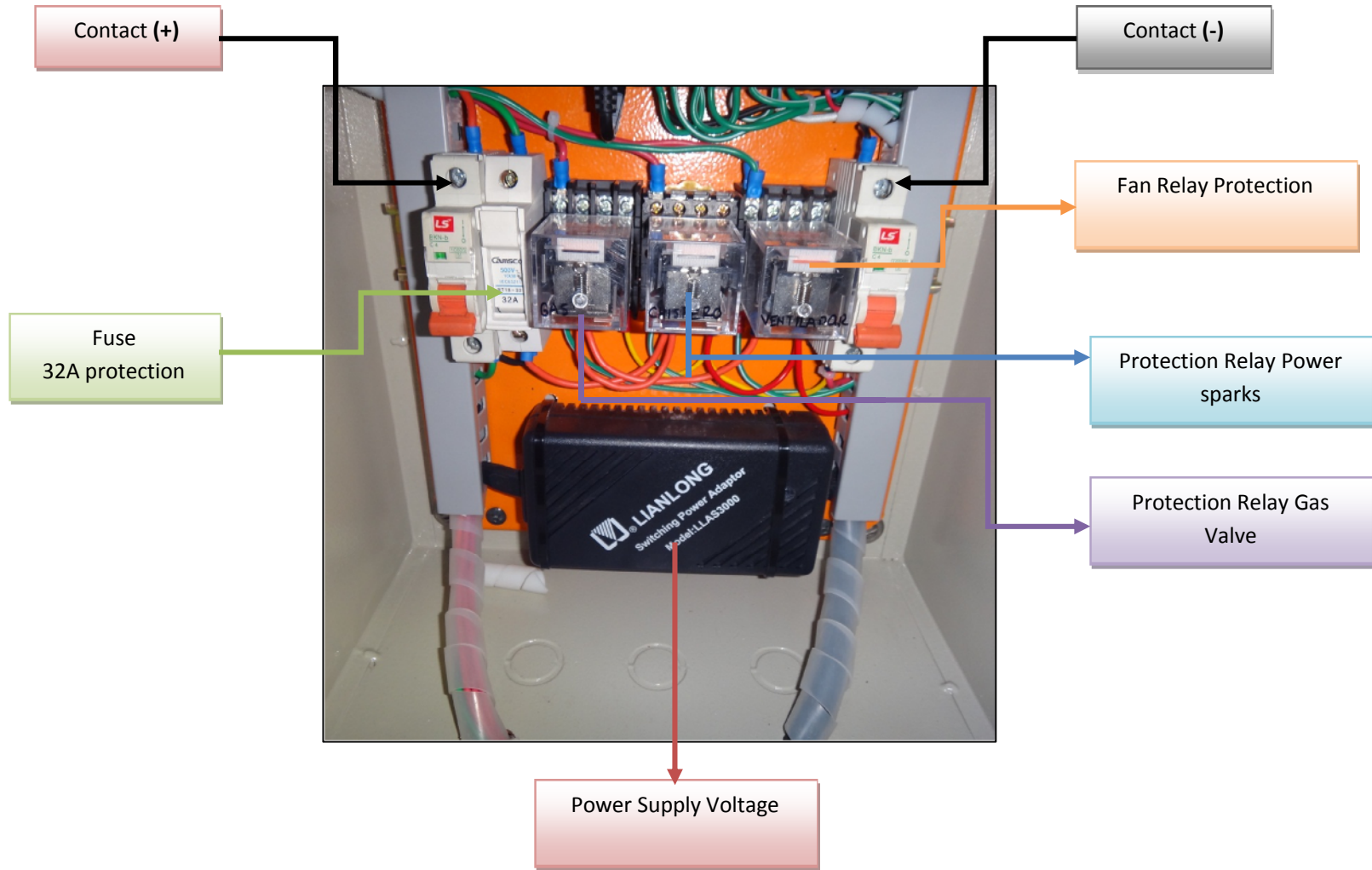
Drying Oven



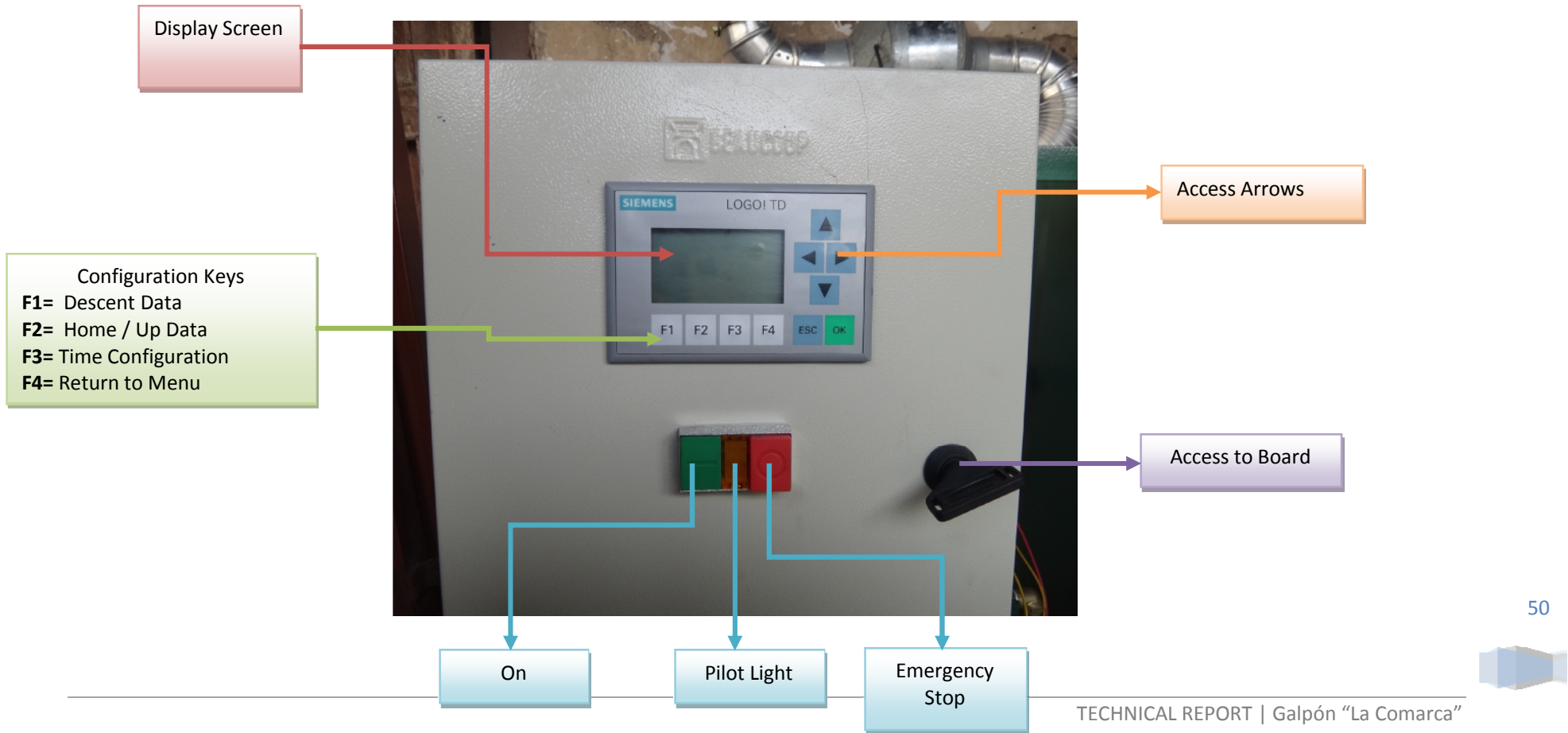
Automatic Control System with Logo! OBA6 12/24RC



Gear System



Display Data Visualization TD



Sensors Control of Raw Material

