



Stock Management and Control in a Local Shop of Animal Products

Ravena de Mello Rodrigues;Ricardo Luiz Fernandes Bella;Douglas Vieira Barboza

Abstract

Due to globalization, the achievement of competitiveness has become fundamental to the organizations that try to be leaner each day, reducing costs, and thus allowing other investments. Thereby, stocks are achieving each day more importance due to its relevance in the company economic stability. A great management allows products never miss in stock and a great management also avoids excess in leftovers. In this project, the importance of stock management carries the objective of optimizing the investments over stocks and of decreasing losses caused by obsolescence in a retail micro company that sells goods for animals. For that purpose, the ABC Classification has been applied in which the main products referred to demand and profits were identified. The supply policy adopted for those products was the Economic Lot Size, calculating the safety stock and the resupply point. It was possible to calculate order costs, maintenance and material through collected data during meetings with the company owners and this way it was possible to realize that the economic buying batch applicability would generate savings relating to the current company model. In addition to the decreasing of the risk of losing items and keeping the safety stock in order to face the demand fluctuations.

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Abstract

Due to globalization, the achievement of competitiveness has become fundamental to the organizations that try to be leaner each day, reducing costs, and thus allowing other investments. Thereby, stocks are achieving each day more importance due to its relevance in the company economic stability. A great management allows products never miss in stock and a great management also avoids excess in leftovers. In this project, the importance of stock management carries the objective of optimizing the investments over stocks and of decreasing losses caused by obsolescence in a retail micro company that sells goods for animals. For that purpose, the ABC Classification has been applied in which the main products referred to demand and profits were identified. The supply policy adopted for those products was the Economic Lot Size, calculating the safety stock and the resupply point. It was possible to calculate order costs, maintenance and material through collected data during meetings with the company owners and this way it was possible to realize that the economic buying batch applicability would generate savings relating to the current company model. In addition to the decreasing of the risk of losing items and keeping the safety

stock in order to face the demand fluctuations.

Keywords: Services management; ABC analysis; Inventory; Economic improvement; Safety Stock.

1. Introduction

With the competitiveness of the market increasing, companies seek to stand out for the quality of their products, but competition also forces entrepreneurs to work with low prices. Thus, the major obstacle for companies is to reduce their costs and improve their reliability simultaneously. For this, organizations seek techniques for cost management and process optimization, considering the computerization of inventory management in the search for competitiveness [1].

In addition to competing with large national companies, Brazilian micro and small companies (MPE) began to face international competition in the 1990s with the opening of Brazilian markets, thus compromising their survival [2]. For this reason, it is vital to rationalize the use of time and resources with the potential to increase profit margins, better satisfy customers and optimize the performance of their activities [3].

Stock management is a common theme in the market and fundamental to business health, because can help micro-companies to be steady and, when this is not done efficiently, leaves the enterprise exposed to not supply your customer demand, generating opportunities for competitors [4].

The relevance of this work is due to the fact that the company object of the study has no knowledge of management practices, and consequently does not use them, as a relevant part of micro-companies.

Due to the absence of management practices, they present several problems, such as loss of capital and compromised profitability, since the company has high levels of inventories that generate losses of products due to obsolescence and losses in sales due to the absence of other products, in addition to the dissatisfaction of customers [5].

The present project aims to propose the implementation of stock management tools in order to improve the resupply policy in a pet food retail micro-company, reducing losses and optimizing investments in stocks. However, it is not for this study to analyze all products in the store, being restricted only to 15kg dog food bags, which will be identified through the ABC classification, as they are the products with the greatest financial impact and because they occupy a larger volume in the stock from the company.

In the structural aspect, the article is divided into five parts: in a first, contextualization and the final objectives of the approach proposed in this study are exposed. In a second part, the methodology used is presented and the understanding of the enterprise where the study was carried out is provided. The third shows the examination and documentation of the application of the method on the pet food retail company. The fourth part discusses the results presented in the previous step, highlighting those that presented themselves as of greater relevance and proposing to use management tools. And in a last stage, the achievement of the goals pursued in the objective of the study is concluded.

2. Material and Methods

This is applied research, exploratory, classified as qualitative and quantitative, and which used the case study in a retail company to study in detail the causes of a determined problem.

2.1 Methodology

The method of this research is formed by a bibliographic research and a case study. The bibliographic research aims to identify and organize the concepts related to the chosen theme based on relevant works [6].

Given that this research is a case study, it should be noted that, this research method ranges from the logic of its planning to the description of data collection and analysis procedures and also the development of the theory, this being an essential part of the project. To design the research, the author highlights four questions for its conduct: "What problems to study?"; "What data is important?"; "What data will be collected?"; and "How to analyze them?" [7].

The research took place in six stages: Kick-off meeting; planning visits throughout the project; collecting and analyzing data related to the store's stock and preparing a proposal for improving the product storage process.

The Kick-off Meeting was held on the first visit, in March 2019, in order to talk with the company owner about the possibility of carrying out an academic study in his store, which was restricted to visits with previous scheduling. Still at this stage, information was collected on the history of the company and its functioning, in order to elaborate the context of the research and also define the objective and the research problem.

On the second visit, a schedule was established with the entrepreneur, in order to decide the best days and times so as not to compromise the operation of the store and enable data collection with ease. In this way, 10 visits were scheduled over 5 months at 2 pm.

Data collection was carried out by means of documents, by direct observation of the company's storage system and through interviews with the store owner and employees using a question script in order to optimize the time and responses of employees. All interviews were recorded.

The time to place and receive an order was observed, which were observed and timed by the researcher in three different days and the systematic of resupply and storage of the store in order to understand its operation, since the company does not have a defined system, and capture possible gaps and then carry out a study and propose solutions.

Regarding the replacement of the items, the period and quantities of goods replaced and the size of the purchase lots were determined. And in relation to storage, it was seen how the stock is organized, where the items are allocated when they arrive at the store and who is responsible for their storage.

Customer service was observed in order to investigate whether there is a recurring lack of products in the store for consumers. At the end of the observations, reports and records with photos were made in order to keep all the information observed.

After data collection, results analysis was carried out to identify the quantity of products in stock, the products to be prioritized based on profitability and demand, and to analyze the stock replenishment policy. The Physical Inventory and ABC Classification tools were used.

The Physical Inventory has the objective of counting the goods in stock [8], and was used because the owner informed during the interview that he was not aware of the quantities of products stocked.

After the inventory, the products were classified according to the logic of the ABC curve, which shows that

not all items are of equal importance, with more significant items that should be prioritized according to demand, profit and sales price [9].

After completing the data analysis, the economic lot buying model was applied to the products prioritized in the ABC classification, in order to compare the results obtained with the current results of the company and propose the application of a replacement policy for the same.

Calculations were performed for: resupply cost and the annual inventory maintenance cost; safety stock; the resupply point; the maximum stock; and comparison between the total cost of the current model and the total cost of the economic purchase lot model.

As for the improvements, it was proposed to use and maintain the physical inventory spreadsheet, in order to optimize the control of product inputs and outputs, since the company does not do this management.

Along with this spreadsheet, the use of visual management was proposed, in order to allow the control of stock levels in the spreadsheet itself, where the column indicating the quantity in stock would signal the owner which action to take, according to the following colors: green, indicating that the stock is at the maximum level, yellow, in the safety stock, indicating the time to place the order with the supplier and red, indicating the minimum stock level [10].

Another possibility for continuous improvement that was analyzed was the application of the 5s tool to promote the reorganization of the stock and encourage the participation of employees in the application of the 5 senses: *Seiri* (classification), separating products by families; *Seiton* (Organization), group the products of the same family as well as identify them by means of labels; *Seiso* (cleaning), clean the stock and products; *Seiketsu* (standardization and health) [11], in addition to organizing and cleaning, carrying out possible repairs and maintenance on the stock structure; *Shitsuke* (self-discipline), consolidate the previous four senses through training with employees and application of the PDCA cycle.

2.1 Characterization of the enterprise

The present project is focused on a retail company located in the city of Niterói, state of Rio de Janeiro with the size of a micro company, according to Sebrae [12].

The company sells various types of animal products, such as dog food, cats, birds, rabbits and horses. There are also other products such as collars, houses for dogs and cats, cages, aquariums, riding accessories, among others. In addition, it offers bathing and grooming for pets and also has a delivery service for neighborhoods located close to the store. Currently, this company seeks to remain in the competitive market, as it has been facing a significant drop in sales of its products.

Its inauguration was in March 2014, when only the owner and his son worked, there is currently one employee, that is, 3 people work at the company in a total area of 90m² organized as follows: service area, where the products are exposed, bath and grooming area, owner's office, bathroom and stock. The company's layout is illustrated in Figure 1.

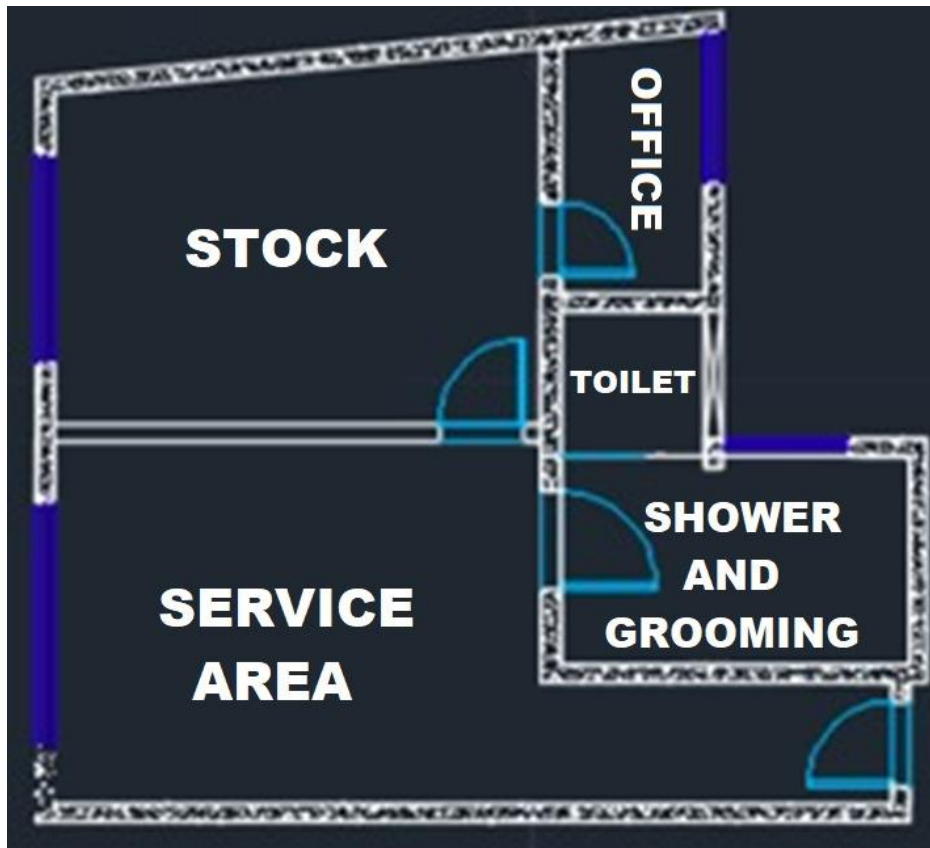


Figure 1. Organizational layout.

Source: Authors.

The company did not have a management system and therefore had problems in the storage process of its items due to the lack of organization and the quantity of products, which caused difficulties in the visibility and distribution of the items in the stock space, as there was no standard storage and shelves.

Other important information are: store opening hours and days, working hours, salary and number of employees, time for placing and receiving orders, responsible for ordering and checking orders, area of store rooms and the lead time of the supplier according to Table 1.

Table 1. Company characteristics.

Operating days	Monday to Friday
Opening hours	8:30h to 20h
Working hours	8 hours per day
Number of workers	3
Employee salary	1500 BRL
Salary of the owner's son	2800 BRL
Time to place an order	30 minutes
Time to receive / check the order	4 hours
Purchasing Manager	Owner's son
Conference officer	Owner's son
Supplier lead time	7 days
Company area	90 m ²

Source: Authors.

3. Examination

After the physical inventory of the company's stock, some items were prioritized for better development of the work according to the interview with the manager, where the 15kg dog food packages were defined as products to be quantified and analyzed, due to the greater impact in terms of space.

So these were accounted for and spread out with the following information: Product name, total quantity in stock, expiration date and sales price, this information being collected by when carrying out the inventory in the stock.

When carrying out the inventory in stock, they were accounted for and spread out with the following information: Product name, total quantity in stock, expiration date and sales price. Demand history was also considered based on notes that the owner makes for his daily cash control from January 2019 to September 2019 (9 months), taking into account that the manager discards his notebook annually.

Because the manager does not know precisely which items generate the most profit for the company, it was decided to apply the ABC curve in order to identify such products. A resupply policy was proposed with the aim of assisting the owner on when and how much to buy with the use of *Kanban* cards, a system that makes it possible to monitor and control stocks in a simplified manner that ensures sufficient stock levels, without exaggeration and without lack, through the replacement of materials based on consumption and lead time [13].

The stock was divided into: Green zone, which indicates the maximum stock level, that is, the product does not need to be replaced or purchased; Yellow zone, which indicates the level of safety stock, that is, it is the point of ordering; Red zone, which indicates the minimum stock level or critical zone, that is, it indicates that the items present there are safe and need to be replaced, this card is used when there is a problem with the replenishment time [14].

The disorganization of the products prevented the exact quantity of each product from being known, generating unnecessary product purchases, losses of products due to expiration and thus losses of capital and customers. And because he does not know what is in stock, the owner could not draw up strategies for his company, because he does not have knowledge about what is his most strategic product, who is his critical supplier, when is the right time to resupply among other problems

The difference between the selling price and the cost price was calculated in order to calculate the profit per unit, and the sum of the profit of all the rations to know the total profit and to know the individual percentage of each product by dividing the profit per unit by the total profit of the products.

Once this was done, the products were ordered in descending order based on the percentage value of profit and thus the accumulated percentage of products was calculated and the ABC classification was performed based on the accumulated percentage according to the results presented in Table 2.

Table 2. ABC classification results

Classes	Quantity of products	Proportion of products	Proportion of Profit
A	6	14%	30%
B	16	24%	38%
C	43	64%	32%

Source: Authors.

It is possible to see that 14% of the products belong to class A, 24% belong to class B and 64% belong to class C and that adding the results of the proportions of values of Class A and Class B we have a profit margin of 68% , that is, 38% of the dog rations are responsible for 68% of the company's profit according to the delimitation. Based on the analysis of the ABC curve exposed in the Figure 2, it is perceived that due to the similarity of the data, it was not possible to reach the proportion of 80% of profits for 20% of products. Then, this same analysis was made for all other indicators in the table, that is, ABC classifications were made based on demand and sales price.

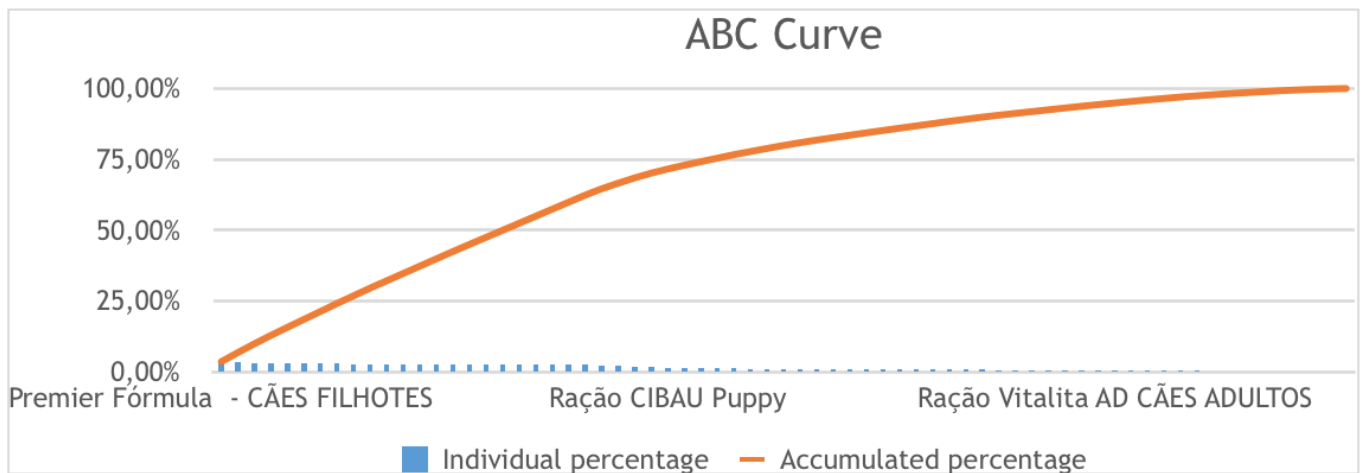


Figure 2. ABC Curve Graphic

Source: Authors

For the demand-based classification, the demands per unit were added up to the total demanded during the 9 months, being calculated the percentages per unit of product, that is, dividing the demand per unit by the total demand and later the accumulated percentages were calculated. Thus, the classification was also made regarding the sale price, using the same procedure that has its results summarized in Table 3 and Table 4.

Table 3. ABC classification results for demanda

Classes	Quantity of products	Proportion of products	Proportion of Demand
A	9	13%	20%
B	23	33%	39%
C	38	56%	41%

Source: Authors.

Table 4. ABC classification results for sales price

Classes	Quantity of products	Proportion of products	Proportion of Sales Price
A	7	10%	19%
B	22	32%	40%
C	40	60%	41%

Source: Authors.

The classification according to demand shows that 13% of the products belong to class A, 33% belong to class B and 56% belong to class C, and that adding the results of the proportions of values of Class A and Class B we have a percentage of demand of 59%, that is, 46% of the dog rations are responsible for 59% of the demand of rations.

While the sales price shows that 10% of the products belong to class A, 32% belong to class B and 60% belong to class C and that adding the results of the proportions of values of Class A and Class B we have a percentage of selling price of 42%, that is, 42% of the dog rations are responsible for 59% of the profit from the company's sales.

Priority was given to products that were repeated simultaneously, in Classes A and B, in the three analyzes, totaling 21 items that are shown in Table 5.

Table 5. Prioritized products

Premier Fórmula - Cães filhotes
Royal Canin Medium Adult
Royal Canin – Giant Puppy
Ração Royal Canin – Maxi Junior
Ração Royal Canin – Maxi Adult
Ração Royal Canin Canine Veterinary Diet Skin Care Small Dog
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães
Premier Ambientes Internos - Cães Adultos
Royal Canin Medium Adult 7+
Ração Royal Canin Veterinary Gastro Intestinal – Cães Adultos
Ração Royal Canin Canine Veterinary Diet Renal Special para Cães
Royal Canin Renal Veterinary Diet Cães
Ração Royal Canin Veterinary Hepatic – Cães Adultos
Premier Seleção Natural Batata Doce – Cães Adultos
Premier Seleção Natural Frango – Cães Adultos Raças Pequenas
Premier Raças Específicas Frango – Pitbull Adultos
Premier Seleção Natural Frango – Cães Adultos Raças Pequenas
Ração Royal Canin Veterinary Obesity – Cães Adultos
Royal Canin Mini Adult
Royal Canin Mini Indoor Adult
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães

Source: Authors

It was observed through this analysis that, unlike what was imagined by the management, the Premier brand rations were the most significant, and Royal Canin has the greatest impact for the company. Since, among the 21 products prioritized 88% of Royal Canin's variations are offered by the company and 66% of Premier rations. Another analysis was regarding the number of brands sold by the store. Currently, the company has 14 feed brands, but only 2 brands were considered representative

During the interviews, the owner informed that there is no criterion for carrying out the replenishment of products, with orders being made according to his experience, within a 30-day interval, that is, at the beginning of each month, the products that are requested are visually out of stock in the store.

There is no minimum and maximum amount of animal feed per order and the time for delivery of orders is 7 days and all transport costs for delivery are attributed to the supplier.

It is noticeable that there is no need to restrict the number of orders, as there is no shipping cost for the company and the lead time of the supplier is relatively short, allowing the batch size of each product to be small and, therefore, to be carried out more orders throughout the month.

Thus, it was necessary to carry out a study to optimize the policy of resupply of the products that were prioritized, for which the economic lot size, the safety stock and the reorder point for each prioritized item were calculated.

4. Proposition of Management Tools

With the objective to maintain the organization of information about the company's stock, a spreadsheet for stock control was proposed, as explained in Table 6.

Table 6. Example spreadsheet to control stocks

Inventory Control Worksheet					
Name	Sale Price	Cost Price	Demand	Quantity in stock	Validity

Source: Authors

Through the spreadsheet it is possible to keep the stock information organized and control the quantity of materials and their expiration dates. With its operation in two stages: a first to register name, sales price and cost, quantity in stock and validity of products; and a second, updating the quantities of registered products as they are sold, as well as their demand.

It was proposed to check the physical inventory spreadsheet every six months and recommended the periodic inventory for the company, validating the information from the inventory carried out in the present study, which found during its check six products with an expiration date for the next 3 months. Therefore, it was proposed that these products be exposed with a discount for sale and the action was carried out as a record in Figure 3.



Figure 3. Registration of the promotional action

Source: Authors

The calculation of the economic lot size (ELZ) for the 21 products chosen was made from equation (1) based on data from interviews and observations of: resupply cost (RC); product demand in the period (D); the annual maintenance cost (aC)

$$ELZ = \sqrt{\frac{2 \cdot D \cdot RC}{aC}} \quad (1)$$

The calculation of the resupply cost was based on the following data: salary of the employee (S) responsible for ordering the rations, which is equal to R \$ 2,800.00, number of hours worked (NHW) in one month, which is equal to 192 hours. For the calculation of the time (t) that the employee spends to place orders, the follow-up was performed and the requisition time for three orders was timed to calculate the average times, as shown in Table 7.

Table 7. Order requisition time

Month	Time (Minutes)
July	30
August	28
September	31
Average	29,7

Source: Authors.

Thus, on average, the time (t) that the employee spends to place an order is 30 minutes, that is, half an hour, and this value should be applied to Equation 2, which represents the RC calculation.

$$RC = \frac{s}{NHW} t \quad (2)$$

Applying the values to the equation, the value of 7.29 BRL per order was reached. And based on the same reasoning, the cost of receipt is calculated, since the same employee responsible for buying and receiving orders has the same salary and number of hours worked. To calculate the receipt time, the receipt time of three orders was timed and the average of the times was calculated, as can be seen in Table 8.

Table 8. Order receipt time

Month	Time (Minutes)	Time (Hours)
July	230	3,833
August	270	4,5
September	290	4,833
Average		4,4

Source: Authors.

On average, the time (t) the employee spends to receive an order is 4 hours and 25 minutes. The equation for calculating this cost is the same equation used for calculating the requisition cost, with which the amount of 64.16 BRL per order is reached. And adding the requisition and receipt costs, the resupply cost is 71.45 BRL per order.

The annual demand was obtained through the notes of the owner of the inputs and outputs of the products during the study period and can be seen in table 9.

Table 9. Demand for prioritized products

Prioritized Products	Annual demand (bags)
Premier Fórmula - Cães filhotes	180
Royal Canin Medium Adult	142
Royal Canin - Giant Puppy	142
Ração Royal Canin - Maxi Junior	142
Ração Royal Canin - Maxi Adult	142
Ração Royal Canin Canine Veterinary Diet Skin Care Small Dog	142
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	142
Premier Ambientes Internos - Cães Adultos	180
Royal Canin Medium Adult 7+	142
Ração Royal Canin Veterinary Gastro Intestinal - Cães Adultos	142
Ração Royal Canin Canine Veterinary Diet Renal Special para Cães	142
Royal Canin Renal Veterinary Diet Cães	142
Ração Royal Canin Veterinary Hepatic - Cães Adultos	142
Premier Seleção Natural Batata Doce - Cães Adultos	180
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	180

Premier Raças Específicas Frango - Pitbull Adultos	180
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	180
Ração Royal Canin Veterinary Obesity - Cães Adultos	180
Royal Canin Mini Adult	142
Royal Canin Mini Indoor Adult	142
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	142

Source: Authors

To calculate the annual cost of stock maintaining, the following were considered: capital opportunity costs based on the cost of products in stock at the company's opportunity rate, considering a fixed income fund with an average yield of 7% per year where the owner applies; and deterioration costs based on the 100% effective obsolescence cost and one year validity [16].

The calculation of the capital opportunity cost for each prioritized product, which is relevant for the company to know the loss of capital invested and paralyzed in stock, is shown in table 10.

Table 10. Calculation of obsolescence cost

Prioritized Products	Cost Price (BRL)	Opportunity rate (BRL)	Opportunity cost (BRL)
Premier Fórmula - Cães filhotes	109.90		7.69
Royal Canin Medium Adult	189.90		13.29
Royal Canin - Giant Puppy	194.90		13.64
Ração Royal Canin - Maxi Junior	159.90		11.19
Ração Royal Canin - Maxi Adult	159.90		11.19
Ração Royal Canin Canine Veterinary Diet Skin Care Small Dog	159,90		11.19
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	159.90		11.19
Premier Ambientes Internos - Cães Adultos	89.90		6.29
Royal Canin Medium Adult 7+	194.90	7%	13.64
Ração Royal Canin Veterinary Gastro Intestinal - Cães Adultos	159.90		11.19
Ração Royal Canin Canine Veterinary Diet Renal Special para Cães	159.90		11.19
Royal Canin Renal Veterinary Diet Cães	159.90		11.19
Ração Royal Canin Veterinary Hepatic - Cães Adultos	159.90		11.19
Premier Seleção Natural Batata Doce - Cães Adultos	89.90		6.29
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	89.90		6.29
Premier Raças Específicas Frango - Pitbull Adultos	89.90		6.29
Premier Seleção Natural Frango - Cães Adultos Raças	89.90		6.29

Pequenas		
Ração Royal Canin Veterinary Obesity - Cães Adultos	159.90	11.19
Royal Canin Mini Adult	155.90	10.91
Royal Canin Mini Indoor Adult	149.90	10.49
Ração Royal Canin Canine Veterinary Diet Urinary S/O	159.90	11.19
Cães		

Source: Authors

Table 11 shows the calculation made by multiplying the cost of effective obsolescence by the cost price of the prioritized products.

Table 11. Calculation of obsolescence cost

Prioritizes products	Cost Price (BRL)	Validity (months)	Cost of effective deterioration	Deterioration Cost (BRL)
Premier Fórmula - Cães filhotes	109,90	12		109,90
Royal Canin Medium Adult	189,90	12		189,90
Royal Canin - Giant Puppy	194,90	12		194,90
Ração Royal Canin - Maxi Junior	159,90	12		159,90
Ração Royal Canin - Maxi Adult	159,90	12		159,90
Ração Royal Canin Canine Veterinary Diet Skin Care Small Dog	159,90	12		159,90
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	159,90	12		159,90
Premier Ambientes Internos - Cães Adultos	89,90	12		89,90
Royal Canin Medium Adult 7+	194,90	12		194,90
Ração Royal Canin Veterinary Gastro Intestinal - Cães Adultos	159,90	12	100%	159,90
Ração Royal Canin Canine Veterinary Diet Renal Special para Cães	159,90	12		159,90
Royal Canin Renal Veterinary Diet Cães	159,90	12		159,90
Ração Royal Canin Veterinary Hepatic - Cães Adultos	159,90	12		159,90
Premier Seleção Natural Batata Doce - Cães Adultos	89,90	12		89,90
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	89,90	12		89,90
Premier Raças Específicas Frango - Pitbull Adultos	89,90	12		89,90

Premier Seleção Natural Frango - Cães Adultos	89,90	12	89,90
Raças Pequenas			
Ração Royal Canin Veterinary Obesity - Cães Adultos	159,90	12	159,90
Royal Canin Mini Adult	155,90	12	155,90
Royal Canin Mini Indoor Adult	149,90	12	149,90
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	159,90	12	159,90

Source: Authors

From the values presented, it was possible to arrive at the value of the annual cost of stock maintaining (aC) by adding the opportunity cost of capital with the cost of deterioration, according to Table 12.

Table 12. Annual stock maintenance cost

Produtos Priorizados	Custo de Oportunidade (BRL)	Custo de deteriorização (BRL)	Custo anual de manutenção (Ca) (BRL)
Premier Fórmula - Cães filhotes	7.69	109.90	117.59
Royal Canin Medium Adult	13.29	189.90	203.19
Royal Canin - Giant Puppy	13.64	194.90	208.54
Ração Royal Canin - Maxi Junior	11.19	159.90	171.09
Ração Royal Canin - Maxi Adult	11.19	159.90	171.09
Ração Royal Canin Canine Veterinary Diet Skin Care Small Dog	11.19	159.90	171.09
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	11.19	159,90	171.09
Premier Ambientes Internos - Cães Adultos	6.29	89.90	96.19
Royal Canin Medium Adult 7+	13.64	194.90	208.54
Ração Royal Canin Veterinary Gastro Intestinal - Cães Adultos	11.19	159.90	171.09
Ração Royal Canin Canine Veterinary Diet Renal Special para Cães	11.19	159.90	171.09
Royal Canin Renal Veterinary Diet Cães	11.19	159.90	171.09
Ração Royal Canin Veterinary Hepatic - Cães Adultos	11.19	159.90	171.09
Premier Seleção Natural Batata Doce - Cães Adultos	6.29	89.90	96.19
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	6.29	89.90	96.19
Premier Raças Específicas Frango - Pitbull Adultos	6.29	89.90	96.19
Premier Seleção Natural Frango - Cães Adultos	6.29	89.90	96.19

Raças Pequenas

Ração Royal Canin Veterinary Obesity - Cães Adultos	11.19	159.90	171.09
Royal Canin Mini Adult	10.91	155.90	166.81
Royal Canin Mini Indoor Adult	10.49	149.90	160.39
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	11.19	159.90	171.09

Source: Authors

With the results of calculations of resupply costs, annual maintenance costs and demand data, it was possible to calculate the economic lot size of the priority feeds as shown in Table 13.

Table 13. Calculation of economic lot size

Prioritized Products	Resupply Cost (RC) (per order) (BRL)	Demand (D) (annual)	Maintenance Cost (aC) (annual)	Economic Lot Size (ELZ)
Premier Fórmula - Cães filhotes		180	117.59	15
Royal Canin Medium Adult		142	203.19	10
Royal Canin - Giant Puppy		142	208.54	10
Ração Royal Canin - Maxi Junior		142	171.09	11
Ração Royal Canin - Maxi Adult		142	171.09	11
Ração Royal Canin Canine Veterinary Diet Skin Care Small Dog		142	171.09	11
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães		142	171.09	11
Premier Ambientes Internos - Cães Adultos	71.45	180	96.19	16
Royal Canin Medium Adult 7+		142	208.54	10
Ração Royal Canin Veterinary Gastro Intestinal - Cães Adultos		142	171.09	11
Ração Royal Canin Canine Veterinary Diet Renal Special para Cães		142	171.09	11
Royal Canin Renal Veterinary Diet Cães		142	171.09	11
Ração Royal Canin Veterinary Hepatic - Cães Adultos		142	171.09	11
Premier Seleção Natural Batata Doce - Cães Adultos		180	96,19	16
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas		180	9619	16

Premier Raças Específicas Frango - Pitbull Adultos	180	96.19	16
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	180	96.19	16
Ração Royal Canin Veterinary Obesity - Cães Adultos	180	171.09	12
Royal Canin Mini Adult	142	166.81	11
Royal Canin Mini Indoor Adult	142	160.39	11
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	142	171.09	11

Source: Authors

After calculating the quantities of feed bags that must be purchased in each order so that the total annual cost is minimized, the time to place an order was also calculated through the safety stock (SS) and the resupply point (Rp). For the calculation of SS, was used the equation 3, where D is Demand and L is the supplier's Lead-time.

$$SS = D * L(3)$$

Thus, the safety stock of each product was calculated as shown in Table 14.

Table 14. Calculation of safety stock

Prioritized Products	Average daily demand	Lead time (days)	Safety Stock
Premier Fórmula - Cães filhotes	0,5	7	4
Royal Canin Medium Adult	0,4		3
Royal Canin - Giant Puppy	0,4		3
Ração Royal Canin - Maxi Junior	0,4		3
Ração Royal Canin - Maxi Adult	0,4		3
Ração Royal Canin Canine Veterinary Diet Skin Care Small Dog	0,4		3
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	0,4		3
Premier Ambientes Internos - Cães Adultos	0,5		4
Royal Canin Medium Adult 7+	0,4		3
Ração Royal Canin Veterinary Gastro Intestinal - Cães Adultos	0,4		3
Ração Royal Canin Canine Veterinary Diet Renal Special para Cães	0,4		3

Royal Canin Renal Veterinary Diet Cães	0,4	3
Ração Royal Canin Veterinary Hepatic - Cães Adultos	0,4	3
Premier Seleção Natural Batata Doce - Cães Adultos	0,5	4
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	0,5	4
Premier Raças Específicas Frango - Pitbull Adultos	0,5	4
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	0,5	4
Ração Royal Canin Veterinary Obesity - Cães Adultos	0,5	4
Royal Canin Mini Adult	0,4	3
Royal Canin Mini Indoor Adult	0,4	3
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	0,4	3

Source: Authors

To calculate the replacement point, the supplier's lead time and monthly demand were multiplied and subsequently added to the safety stock according to equation 4.

$$Rp = (L.D) + SS \quad (4)$$

The results can be seen in Table 15.

Table 15. Calculation of replacement point

Prioritized Products	Monthly demand	Lead time (month)	Safety Stock	Lead time x Montly demanda	Replacement Point
Premier Fórmula - Cães filhotes	15	0,25	4	4	8
Royal Canin Medium Adult	12		3	3	6
Royal Canin - Giant Puppy	12		3	3	6
Ração Royal Canin - Maxi Junior	12		3	3	6
Ração Royal Canin - Maxi Adult	12		3	3	6
Ração Royal Canin Canine Veterinary Diet Skin Care Small Dog	12		3	3	6
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	12		3	3	6
Premier Ambientes Internos - Cães Adultos	15		4	4	8
Royal Canin Medium Adult 7+	12		3	3	6
Ração Royal Canin Veterinary Gastro Intestinal -	12		3	3	6

Cães Adultos				
Ração Royal Canin Canine Veterinary Diet Renal Special para Cães	12	3	3	6
Royal Canin Renal Veterinary Diet Cães	12	3	3	6
Ração Royal Canin Veterinary Hepatic - Cães Adultos	12	3	3	6
Premier Seleção Natural Batata Doce - Cães Adultos	15	4	4	8
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	15	4	4	8
Premier Raças Específicas Frango - Pitbull Adultos	15	4	4	8
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	15	4	4	8
Ração Royal Canin Veterinary Obesity - Cães Adultos	15	4	4	8
Royal Canin Mini Adult	12	3	3	6
Royal Canin Mini Indoor Adult	12	3	3	6
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	12	3	3	6

Source: Authors

To calculate the maximum stock the ELZ and the Rp were added, and with them the values of the maximum stock and the current stock of the company, reaching the value of the excess stock that the company maintains, as shown in Table 16.

Table 16. Calculation of maximum stock

Prioritized Products	Replacement Poin	Economic Lot Size (ELZ)	Maximum Stock	Current Stock	Excess Stock
Premier Fórmula - Cães filhotes	8	15	22	70	48
Royal Canin Medium Adult	6	10	16	40	24
Royal Canin - Giant Puppy	6	10	16	35	19
Ração Royal Canin - Maxi Junior	6	11	17	22	5
Ração Royal Canin - Maxi Adult	6	11	17	23	6
Ração Royal Canin Canine Veterinary Diet Skin Care Small Dog	6	11	17	20	3
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	6	11	17	40	23

Premier Ambientes Internos - Cães Adultos	8	16	24	36	12
Royal Canin Medium Adult 7+	6	10	16	37	21
Ração Royal Canin Veterinary Gastro Intestinal - Cães Adultos	6	11	17	55	38
Ração Royal Canin Canine Veterinary Diet Renal Special para Cães	6	11	17	58	41
Royal Canin Renal Veterinary Diet Cães	6	11	17	50	33
Ração Royal Canin Veterinary Hepatic - Cães Adultos	6	11	17	54	37
Premier Seleção Natural Batata Doce - Cães Adultos	8	16	24	51	27
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	8	16	24	30	6
Premier Raças Específicas Frango - Pitbull Adultos	8	16	24	29	5
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	8	16	24	27	3
Ração Royal Canin Veterinary Obesity - Cães Adultos	8	12	20	30	10
Royal Canin Mini Adult	6	11	17	30	13
Royal Canin Mini Indoor Adult	6	11	17	32	15
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	6	11	17	34	17

Source: Authors

It was confirmed that the company maintains high levels of inventories, has been wasting capital and space. From which a comparative analysis was made between the company's current stock investment and the investment proposed by ELZ according to Table 17.

Table 17. Analysis of the amounts invested in stock

Prioritized Products	Maximum Stock Value (BRL)	Current Stock Value (BRL)	Cost reduction (BRL)
Premier Fórmula - Cães filhotes	2,449.65	7,693.00	5,243.35
Royal Canin Medium Adult	3,021.29	7,596.00	4,574.71
Royal Canin - Giant Puppy	3,075.69	6,821.50	3,745.81
Ração Royal Canin - Maxi Junior	2,687.45	3,517.80	830.35
Ração Royal Canin - Maxi Adult	2,687.45	3,677.70	990.25
Ração Royal Canin Canine Veterinary Diet Skin Care	2,687.45	3,198.00	510.55

Small Dog			
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	2,687.45	6,396.00	3,708.55
Premier Ambientes Internos - Cães Adultos	2,144.33	3,236.40	1,092.07
Royal Canin Medium Adult 7+	3,075.69	7,211.30	4,135.61
Ração Royal Canin Veterinary Gastro Intestinal - Cães Adultos	2,687.45	8,794.50	6,107.05
Ração Royal Canin Canine Veterinary Diet Renal Special para Cães	2,687.45	9,274.20	6,586.75
Royal Canin Renal Veterinary Diet Cães	2,687.45	7,995.00	5,307.55
Ração Royal Canin Veterinary Hepatic - Cães Adultos	2,687.45	8,634.60	5,947.15
Premier Seleção Natural Batata Doce - Cães Adultos	2,144.33	4,584.90	2,440.57
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	2,144.33	2,697.00	552.67
Premier Raças Específicas Frango - Pitbull Adultos	2,144.33	2,607.10	462.77
Premier Seleção Natural Frango - Cães Adultos Raças Pequenas	2,144.33	2,427.30	282.97
Ração Royal Canin Veterinary Obesity - Cães Adultos	3,159.83	4,797.00	1,637.17
Royal Canin Mini Adult	2,641.87	4,677.00	2,035.13
Royal Canin Mini Indoor Adult	2,572.95	4,796.80	2,223.85
Ração Royal Canin Canine Veterinary Diet Urinary S/O Cães	2,687.45	5,436.60	2,749.15
TOTAL	54,905.67	116,069.70	61,164.03

Source: Authors

With the values in Table 16, it can be seen that the use of the Economic Lot Size generated savings of 61,164.03 BRL, based on the company's current inventory levels. It is worth mentioning that this economy refers only to the 21 items prioritized by the ABC Classification. This savings would be even greater if the study included all the products in the store.

4.1 Organization and Resupply systematic

Aiming to control the company's stock in a simplified way and based on the calculation of the safety stock, a visual management of the stock levels was proposed to optimize its control, so that everyone can identify the point of resupply of the products.

A stock divided into three zones was proposed:

- Green zone: The stock does not need replenishment, as it is at the maximum stock level;
- Yellow zone: the stock is at the point of ordering, that is, at the safety stock level; and
- Red zone: the safety stock is being consumed, that is, the situation is critical and the items need to be replaced urgently.

Based on the calculations made of the safety stock and the resupply point together with the product planning

and information, it will be possible to use visual management in this same organization. With the maintenance of the information of product inputs and outputs, visual management can be applied in the spreadsheet itself, so that the cells composed of the quantities of products stored are programmed to change their color according to the stock level, that is, remaining green when the stock level is maximum, yellow when the level reaches the safety stock and red when the safety stock is being consumed.

Knowing that the order point will be when the cells are yellow, the manager will know when to place an order and which products to purchase, optimizing their investments and building a resupply systematic with the daily control of product inputs and outputs in an automated spreadsheet.

4.2 5s Program

The use of the program is justified, as some negative points were noted during the research, such as: Absence of systematic storage of products; Dirty stock; Products without identification; Absence of cabinets, shelves and divisions; and Difficulty viewing products.

The application of the 5s will be divided into two stages: presentation meeting and application of the 5 senses. In the first, all workers will be brought together to introduce them to the 5s program, its importance to the company, stimulate commitment and generate an action plan for its application with 5 steps that will be exposed in the store to be more effective.

The next step and its 5 steps will be the application of each of the senses. Seiri (classification) being the first, in which responsible for this sense would be responsible for separating the products by families.

The second sense is Seiton (organization), in which the person in charge will have the function of storing the items of the same family in a specific place and identifying them by means of labels. It was proposed that the organization be made by adopting shelving with shelves to optimize space and based on the FIFO (first in first out) operation, ensuring that products stored for the longest time are dispatched beforehand, avoiding risks of deterioration and obsolescence. In addition, allocating the products with the highest demand close to the out of stock and the products with the lowest demand at the end of the stock, avoiding further movement and optimizing replacement time.

In the third sense, Seiso (cleaning), the person in charge will clean the stocked products, the entire stock area and the products in the service area. In Seiketsu (standardization and health), the responsibility is of the owner, who must carry out an assessment of his facilities in order to verify the need for renovations or repairs, the functioning of the lighting lamps and if any risks of product fall

The latter sense is responsible for the consolidation of all other senses, being linked to self-discipline, Shitsuke is the reflection of all planning, training, application of all other senses and the discipline of the owner and his employees to maintain the adopted 5S standard, and it is proposed that organizational supervision be carried out throughout the end of the month.

5. Conclusion

In view of the relevance of the application of inventory management models, the contribution of this project was noticeable, as it was possible to conclude that in the case study stock, there was excessive waste, which proves to have a lean stock is less expensive, improves performance consequently makes the company

more competitive in the market. Soon, the research objective was achieved by using an economical lot size model, in order to propose a new supply policy for the company.

With regard to academic contributions, this research contains some tools that can be used for inventory management and process improvements, serving as a background for other cases, so it is important to be collaborating as a reference model for both the environment and academic and society.

It is recommended that studies be carried out with all the other products of the same branch that were not covered in the present study and develop mathematical models that verify the best replacement policy according to the basic stock characteristics, case studies should be developed in other organizations in this market sector and multiple cases are compared aiming that the results for companies in the sector can be even better..

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