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OPERATIONAL RESULT THROUGH VARIABLE COSTING: AGRICULTURAL AND POULTRY PRODUCTION

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Abstract

The objective of this work is to apply the variable costing method in an agricultural (maize production) and poultry (chicken farming) property, in order to assess the contribution margin of each activity, with the aid of cost accounting and agribusiness techniques. With regard to methodological procedures, the study was design as: field study, descriptive-exploratory, case study and applied research. The property that was the object of this study, located in the state of Paraná, Brazil, develops temporary maize crops and also undertakes poultry farming. The result, obtained under a comparative unit analysis of the contribution margin, in which chicken farming was done per unit and the maize crop was evaluated in bushels, detected that the latter has greater representativeness; however, when the analysis was carried out according to area, poultry farming reversed this representativeness. Lastly, it was concluded that even with these differences, both showed a positive margin in covering their fixed costs and both are profitable.

Keywords: *Agricultural and poultry farming activity, variable costing, contribution margin.*

1. Introduction

Cost information is extremely important for managers of any given crop, regardless of the productive activity involved. In rural properties, information is essential for decision making, as prices in the marketplace are influenced by supply and demand, and not by individual producers. Cost control becomes an instrument of revenue information and, despite technological advances, farm managers often lack the necessary tools for decision making.

In this regard, cost accounting provides ways to measure these aspects, using different costing methods, according to the purpose and needs of the user.

Considering the level of competitiveness witnessed in all productive activities, the need is detected to continuously expand the understanding of the results obtained when measuring production. It is a fact that farmers are almost always more concerned with the technical aspects of their activity than with ways to assess and control production in terms of costing and with determining financial results. Another factor is the reality of little formal education and lack of knowledge regarding tools that can provide them, in a practical and simple manner, with decisions regarding their activities in the field of agribusiness.

With that, we detected the possibility of undertaking research to perform a study on costs, in a rural property, in order to make available instruments for its management, considering that in agricultural activity the focus of managers is concentrated on production and not on controlling costs in obtaining results, as most often producers play the roles of manager and producer simultaneously.

To that end, the following question was established: *does the variable costing method provide sufficient information to manage a rural property in terms of the contribution margin in agricultural and poultry production?*

The objective established for this study stems directly from this question, and it was determined as: *applying the variable costing method in an agricultural and poultry farming property in order to assess the contribution margin per activity, in order to aid managers in decision making.*

This work is organized in four sections, in addition to this introduction. The second section undertakes a literature review to support the case under analysis. The third section presents the methodology of the work, in order to clarify the form in which the research was carried out. The fourth section presents the results of the research and its analyses. Lastly, it presents the final considerations of the study, so as to answer the question and objective proposed herein.

2. Literature Review

The emergence of industry in the late 18th century attributed new functions to accountants, who came to play a fundamental role in that reality. What was previously a simple process of property control became much more complex, as companies were developing and requiring more accounting information. Cost accounting was created at that time, with a focus restricted to generating information on the production process, controlling these activities, measuring their costs and reporting to managers, who were now more distant from production, and therefore required reports that could allow them to monitor this process.

These informational reports based on costs represent the evolution from how information was generated before, towards a more precise model of production evaluation. It consisted of changes and implementation of new management concepts, as allowed a new standpoint on businesses, given that cost accounting defined their purpose as to receive, organize, analyze and interpret data, generating information on sales and production (Martins, 2006). The use of this method aids managers in establishing goals and objectives, to assess production costs, as well as to establish criteria to distribute costs from the production and services departments onto the products, with the aim of giving transparency to value measurement.

2.1 Control Costs

Martins (2006) states that cost accounting features two considerably relevant functions: to aid control and assist decision making. With regard to control, the most important aspect is to provide data to establish standards, budgets and other forms of forecasting. Next, it is necessary to monitor what will effectively happen, in order to compare it to previously defined data, thus aiding in future decision-making processes.

To attribute costs to products and/or services, costing methods are used, some of which have control purposes while others have management purposes. Absorption costing, according to Megliorini (2012), is a method that attributes fixed costs and variable costs to products. Thus, manufactured and stocked products absorb all the costs incurred over a period. For their part, expenses are not part of the cost of the good or service – that is, they are entered directly on the result (ABBAS et al, 2012).

Martins (2006) mentions that, although the absorption method is not considered logical when the cost of the production and services departments is distributed to the products – in certain cases even arbitrarily, failing as a management instrument – it is mandatory for purposes of inventory evaluation. In Brazil, absorption costing is also used for income tax purposes, in which, with a few exceptions, it is used mandatorily.

This method is still used in financial accounting, and is valid for balance sheet and income statements alike, as well as for balance and taxable income in most countries. Nevertheless, because it features distortions in the distribution of costs among several products and services, it may mask waste and other inefficiencies in production. Therefore, it is not used as a cost management tool.

Standard cost, also used with control purposes, is a base cost established to be compared to the real cost (Martins & Rocha, 2010). In its management concept, standard cost indicates an ideal cost that should be pursued, serving as a basis for managers to mediate the efficiency of production and learn about cost variations. This ideal cost is the one that should be obtained by the business under conditions of full efficiency and maximum yield.

To Zanluca (2012), some essential characteristics of the standard costing method are pre-fixed value, based on previous history or on goals to be pursued by the company. It can be used by accounting, as long as its variations can be adjusted periodically in order to accompany its real effective value (through the cost absorption method). It allows greater ease in assessing balance sheets, and is used often by companies that require speedy access to accounting data.

2.2 Decision Costs

The use of cost accounting for managerial purposes aims to meet the need of managers to better fundament their decisions based on reports that adequately measure the company's production processes. One of the most popular methods under this perspective is Activity-Based Costing - ABC, which stands out from other methods by its way of applying and distributing indirect costs within organizations. The main characteristic of ABC costing is to consider undertaken activities as an original source of costs of products/services. This differentiates it from control-centered methods, which focus more on the cost of direct labor and raw materials to direct costs towards products/services, and the volume of production (Cooper, 1998 *in* Lima, 2003).

ABC costing proves to be an important tool for business management, in the view of Kaplan (1999) *apud* Lima (2003), as it provides greater accuracy in devising product costs,

as this information is of extreme importance in preparing more precise budgets and decisions with regard to prices, discounts, profitability, and contribution margin. Another important aspect with regard to the use of ABC is that in order to establish cost control, this method analyses and evaluates the necessary activities for the production of products and services, identifying their costs and which activities can be improved, and whether any of them can be discarded.

In the view of Leone (2000) these activities are responsible for consuming the resources of a company, and, as such, resources must be appropriated in the best possible way within each activity. For their part, they consume resources and when measured, they reveal whether or not they are adequately contributing to the elaboration of the costs linked directly to products. Although this costing method provides an improved analysis of production costs, this technique cannot be considered adequate for all business types, as the purpose of any costing method is to provide useful information for management and decision making. If the information generated by ABC costing is not valid for organizational management, it is not necessary to implement this costing method.

Another widely used method used in management is variable costing. In this method, variable costs are allocated to products while fixed costs are considered periodical costs assuming that the company, in order to operate, is already committed to these fixed costs (Bornia, 2010). Its premise is the separation of all expenditures according to their variation with regard to the company's volume of production. These expenditures are classified into fixed or variable, and are identified according to their oscillation with regard to the level of production generated over a given period (Crepaldi, 1999).

In terms of viability, variable costing uses the contribution margin, which consists of a resulting value that indicates the share of contribution that each product/service generated at the time of its commercialization towards the company's profits. The contribution margin, according to Bornia (2010) represents the share of the sale price that remains in order to cover the fixed costs and expenses and to generate profit. Other tools, such as the break-even point, safety margin and operational leverage, are directly derived from the calculation of the contribution margin.

Some advantages of this method are highlighted by Leone (1997, p.341), such as: a) generating information when determining which products, product lines, department, sales territories, clients and other segments (or objectives) are profitable; b) periodic costs do not "hide" inside the inventory of manufactured and ongoing products, which would result in illusory profit figures; c) fixed, periodical and repetitive costs, as they are highlighted in the income statement, facilitate the administrator's vision on the amount of these costs and expenses, as well as the influence they have over the profits of the business; d) it is easily connected to the other cost systems; and) flexible budget stand out as a parallel product in the use of variable costing.

From this, we gather that variable costing actually stands out by providing information solutions that serve to support decision making. Therefore, it becomes an excellent tool to provide information for decision making; variable costing will serve to inform the economic-financial contribution brought by poultry farming and by agriculture, thus allowing a comparison of the results in order to determine which one gives greater return to the owner according to the occupied area. This study uses the variable costing method as a way to measure the results between the two different farming activities.

2.3 Poultry Farming

Throughout the history of Brazil, according to Araújo (2008), there has always been traditional and family poultry farming, known popularly as country chicken production. In general, properties produced meat and eggs for consumption, trading the excess production whenever possible. Starting in the 1960s in the state of Santa Catarina, a model known as integration was implemented, as stated by Araújo (2008), which is nowadays widely used nationwide. Before that time, in São Paulo state, this activity was developed independently, in which poultry farmers acquired raw materials in the marketplace, fattened the birds and sold them for slaughter to an abattoir.

Poultry meat production was gradually consolidated. Companies that already dealt in pork production or in grains invested in the trade of poultry meat as well. They were propelled by the supply of credit for long-term investment, initially linked to the use of foreign technologies, with regard to genetics and environmental, health and nutritional techniques for slaughter and processing. Dambrós (2011) comments that in the 1990s, especially with the economic opening and later with the control of inflation, agribusinesses entered the age of competitiveness, in which technological restructuring, efficiency, cost reduction and administrative restructuring of companies transformed into survival strategies. In that period, poultry farming sought to conquer new markets, offering products with higher added value (cuts, *nuggets*, pizzas, etc.).

Dambrós (2011) further comments that in the first years of the present century poultry farming has seen considerable growth. The conquest of foreign markets proved the health of our flocks, which managed to remain immune to the problems of avian flu that affect production in the rest of the world. On the other hand, the expressive improvement in the income of Brazil's population in recent years has propelled domestic consumption of the product. In terms of quality, inspected slaughter has shown noticeable growth in Brazil – in 2006, the number of birds slaughtered under state and federal inspection was 98% (Dambrós, 2011).

The increase in poultry consumption in the domestic market has currently resulted in reduced exports. P*er capita* consumption according to Crepaldi (2011) has reached about 23 kilos. But this has been changing, given that the domestic market forecasts stabilization, and bird negotiation is turning towards the foreign market as well, as it is already responsible for absorbing the expansion of the country's production. With the stabilization of the domestic market, those responsible for poultry exports are seeking new markets such as Russia, Iran and Cuba, but remain in negotiations with traditional foreign markets – Saudi Arabia and Japan.

For their part, the income of poultry farmers is influenced by a series of factors, which have been carefully studied, as income is the final object of their rural enterprises. Some of these factors, in addition to land, labor and capital (the main ones), are climate variations, prices and influent technologies. It thus becomes evident that income is the main factor that influences the decision making of a poultry farmer. Knowledge of these influencing factors on production/rearing by farmers and technicians that provide assistance and planning is essential, considering that by undertaking a study of the property and analyzing the obtained results it is possible to achieve greater production yields.

According to Crepaldi (2011) influencing factors are divided into external and internal. External factors are those over which rural producers have no direct influence –prices, the market, the road system and credit, as well as climate factors and political structure of the government; the latter has great influence over prices. For their part, internal factors are

those in which the owner exerts direct influence – the main ones include crop and flock yields, the size or volume of business and labor efficiency. As such, the owner who best manages his property, using the basic factors in adequate proportions, and adequately combining the remaining influent factors in his economic yield, will likely have a higher income that another owner with inferior administrative capacity.

2.4 Temporary Crops

Temporary crops are those subject to re-sowing after harvest and whose life span is shorter than one year. This type of crop, according to Oliveira (2010), is extracted from the soil during harvest in order to be sown again. In the state of Paraná, the most common are: soybean, rice, maize, bean and others. This type of crop, when in formation, is recorded by accounting in the Current Assets, as inventory, and is regarded as a product under processing. That is the account, according to Oliveira (2010) that will receive all the necessary costs to form the crop, from soil preparation until harvest.

The costs that will be destined to this account, regarded as identifiable expenditures, can be direct or indirect. Whenever the property has only one type of crop, all costs are classified as direct. Properties that have more than one crop and that have costs that cannot be linked to a specific crop, have costs that are classified as indirect. Oliveira (2010) gives the example of a tractor that serviced several crops over the same period. The depreciation of this machine, according to the author, is classified as an indirect cost, justifying its classification with the mandatory adoption of an allotment system to distribute this cost among the crops in which it was used.

Non-identifiable costs with the crop are known as expenses; therefore they do not accrue in the inventory, in the temporary crops under formation account, but are appropriated as expenses from that period. During the harvest period, all costs accumulated in the temporary crop under formation account are transferred to a new account named agricultural products and, in that account, the types of products must be specified separately. There are certain cases in which the harvest is not concluded in the same period, making it necessary to create an account named ongoing harvest.

Whenever some of these products are sold, the amounts are taken from the agricultural products account and transferred to the result cost account of the sold products, making it necessary to specify which product was sold. In this study, maize is the temporary crop under study.

3. Methodology

3.1 Research Type

To perform research, methodological aspects are used, defined by Marconi and Lakatos (2010, p. 46) as “the set of systematic and rational activities that, with greater safety and economy, makes it possible to reach the objective – valid and true knowledge –, tracing the path to be followed, detecting errors and aiding decisions”. The procedures observed when preparing a study are organized according to the particularities of each research. The methods are the basis from which to undertake research, as it seeks and adds value to science.

According to Beuren *et al* (2009), when faced with the need to define the arrangement of the research, with regard to the objectives, a work can fit as exploratory, descriptive or qualitative research. In that regard, the objective of this work fits into a descriptive-

exploratory research, as it describes the main characteristics of the property in terms of its activities – maize crop and poultry farming – using standardized techniques of data collection and applying the variable costing method.

All research, according to Gil (1999), when based on the search for knowledge for the simple satisfaction of acting, can make use of intellectual reasons. Therefore, there can be pure research and applied research. With that, this research is classified with regard to the nature of the problem as applied research, as previously established specific pieces of knowledge were applied, using references to add new knowledge.

Gil (1999) states that to identify an arrangement, the most important element is the data collection procedure, which can be divided into two groups: so-called paper sources (bibliographical research and documental research) and those using data provided by people (experimental research, research *ex-post facto*, assessment, field study and case study). In this study, we used bibliographical, documental procedures and assessment in the form of a case study; because it is descriptive-exploratory research developed through interviews and document analysis, having as object the agricultural and poultry farming activities, this method provided the tools to undertake it.

Lastly, with regard to the environment, Ruiz (2011, p.50) divides it into three environmental categories: field, lab and bibliographical, with field defined as that which "[...] consists of the observation of facts as they occur spontaneously, in data collection and in recording assumedly relevant variables for later analyses". In this regard, this work fits as a field study, as it took place at a rural property, where the facts were observed, data were collected and the relevant variables were recorded, with no isolation or control, allowing only a comparison.

3.2 Methods of Data Collection and Analysis

Data collection took place through a field study, using interviews and documental analysis into the property as research instrument, with information provided by the producer. The data collected from agricultural and poultry farming activities were considered since the arrival of materials, separately for each activity. Systematic monitoring was also adopted through a physical control of resource distribution. This fact is relevant when assessing the operational result per activity during the object period of the research.

With regard to data analysis, Gil (1999, p.168) highlights that "analysis aims to organize and summarize data so that they can provide answers to the problem proposed for investigation". Regarding the interpretation, it was done by linking the data other previously acquired knowledge, with the pieces of knowledge observed and obtained in that process, aiming to find the exact meaning of the finding. The process of analyzing and interpreting the results of this work is presented through descriptive statistics in terms of presentation, with analyses in light of those of the theory.

4. Presentation and Analysis of the Results

4.1 History of the Property

The property that is object of this study is located in the municipality of São Jorge do Ivaí, state of Paraná/Brazil. It develops the temporary crop of maize following the summer crop, known as "second-harvest maize", which has emerged as an alternative source of

revenue for the producer. This crop, in addition to providing greater occupation time for the area, shows excellent use of time, as this period is regarded as banal for most crops due to the climate in southern Brazil.

The sowing method used is known as "mechanized no-till". It involved the use of chemical fertilizers and pesticides to improve production. The sown area totaled 122.6 hectares and began in March 2012; harvest took place in August of the same year. All tasks in the property were carried out using machines and devices belonging to the owner of the farm. With regard to labor, it is outsourced during sowing.

With regard to the poultry farming activity, the area involved totals 0.15 hectares (1,500 m² including the build area and the space reserved for the loading and unloading of trucks). Only one employee is hired to carry out this activity, receiving a fixed salary to provide his services in the farm. The poultry farm is capable of housing 10,000 chickens.

It should be emphasized that chicken production is considered a service – that is, the producer, through an integration contract with the agricultural industry (slaughterhouse) receives the chicks, feed and technical assistance to fatten the birds. The first stage of production consists of receiving the chicks in the farm. They arrive at one day of age (labor from the slaughterhouse), remain in the incubator for about 10 days, and then the "walls" of the incubator are removed (the tarps that form inside the farm are raised).

With this procedure, space is increased and subdivided into smaller spaces so that not all feeders need to be filled. This process is done gradually until the chickens reach enough size to remain free throughout the grange. At the end of the fattening period (42 to 45 days), the slaughterhouse sends the company's trucks and employees to collect the chickens from the grange, place them in boxes and load the trucks.

4.2 Temporary Maize Crop

4.2.1 Indirect Costs of Maize Production

The assessment of information relative to production of "second-harvest maize" was carried out from documents and an interview with the producer during visits to the property. With those in hand, the proper segmentation into costs and expenses was done, according to their nature, and then the costing of the activities was determined. In terms of presentation, initially the costs with electricity will be mentioned, which for its part, is consumed only in the storage shed for machines, implements and materials for maize production. It was determined that the cost with electricity totaled R$ 229.80 and its percentage of consumption was 10%, given that the electricity consumed in the shed came only from lamps and to power the seed machine.

Depreciation was calculated so as to remove the residual value from the basis of calculation. In a more technical definition of the calculations utilized, norm IAS 16 was followed (found in Technical Pronouncement CPC 27). It states that the residual value of an asset "is the estimated amount an entity would normally by disposing of an asset, after deducting the estimated disposal costs, if the asset already had the age and conditions expected at the end of its useful life". This method was used because the goods had already surpassed the period of their useful life, but still had market value.

The list of the goods and values used for the maize crop totaled R$ 287,500.00. With a total amount to be depreciated of R$ 233,600.00 and residual value of R$ 53,900.00, the total value of annual depreciation is R$ 18,512.00, which divided into 12 months and multiplied by 6 months, results in R$ 9,256.00 of depreciation during this period. This calculation was done because the cycle of the temporary crop lasted 6 months. After finding the depreciation

values, the real values to be made available were calculated, such as the variable costs with the depreciation of machinery, according to the number of days they were used in the crop. It can be verified that the total depreciation to be destined to the crop as a variable cost was R$ 578.00 and fixed cost of R$ 8,678.00. It should be highlighted that the depreciation of the shed does not depend on production. Table 1 describes the indirect costs of the maize crop, fixed and variable alike; costs with water are not included because it is provided by an artesian well.

Table 1. Total Indirect Costs of Maize Crop

DESCRIPTION	FIXED (R$)	VARIABLE (R$)
Fuel		7.150,00
Oil lubricant		1.450,00
Carter Oil		560,00
Displacement/Travel		660,00
Machinery Maintenance		3.000,00
Electricity	229,80	
Depreciation of Machinery	523,00	
Depreciation of Shed	55,00	
TOTAL	807,80	13.343,00
Indirect costs per Hectare		
Maize crop 122.6 ha	6,59	108,83

Source: The research (2012)

Table 1 lists the indirect costs of maize production, distributed into fixed and variable. Thus, the costs with machinery and equipment used in total production added to R$ 9,820.00, while maintenance of the machinery totaled R$ 3,000.00. Lastly, electricity and depreciation were calculated, with electricity costs of R$ 229.80 and depreciation of R$ 578.00. It should be reminded that the depreciation of the shed was allocated to cost due to storage of materials inside it, but that it was also calculated according to the number of days in which the materials were stored. The remainder of the depreciation, totaling R$ 8,678.00, was considered to be an expense, as it represents the period in which they were not used in the crop.

4.2.2 Direct costs of maize production

The direct costs of maize production are formed by materials (seeds, fertilizer, herbicides and fungicides) and labor (outsourced). The costs with labor were calculated through the day rates for the services rendered and according to the task of each person in the property. The analysis demonstrated the value of the outsourced labor, which, since the start of sowing until the harvest were performed by the combine operator, the producer and driver. They worked both in the sowing season, transporting seeds and fertilizers, and during harvest, transporting the products; thus, labor costs totaled R$ 7.745,00.

To complete the direct costs of the production of the maize crop, the material used in the crop were verified, which totaled as maize production R$ 49,400.00, fertilizers R$ 10,620.00, manure R$ 45,115.00, and total costs of R$ 105,135.00. Expenses with the maize crop comprised the rural property tax – ITR, referring to the planted area and the storage shed for materials and machinery. The producer paid R$ 557.37 in taxes, divided the amount

by the total area of the property (136 hectares) and multiplied it by the area featuring the maize crop (122.6) and the area occupied by the shed where the machinery (0.15 ha) is stored, obtaining the amount of R$ 500.00, entered as a fixed expense with ITR.

4.2.3 4.2.3 Total Variable Costs of the Maize Crop

The table below shows the total variable costs with the maize crop.

Table 2. Total Variable Costs of the Maize Crop

Variable cost	Maize crop
Total variable costs	126,223.00
Planted area (Ha)	122.6
Variable cost per Ha	1,029.55
Average of Bushels/Ha	87
Variable cost of Bushel	11.83

Source: The research (2012)

Table 2 shows that the total variable costs of the maize crop were R$ 126,223.00; dividing it by the planted area the cost per hectare of R$ 1,029.55 was obtained; according to the yield of 87 bushels per hectare, the cost per bushel was R$ 11.83.

4.3 Poultry Farming Activity

4.3.1 Indirect Costs of the Poultry Farming Activity

The indirect costs of the poultry farming activity comprise the consumption of electricity and the depreciation of the shed and equipment used in rearing the chickens. The electricity costs were calculated based on the approximate percentage of use by the chicken grange. This calculation totaled, with electricity in the period R$ 2,068.20 and, considered as a variable cost because the amount spent with electricity varied according to the period, influencing in the poultry farming. It should be reminded that the expenditure with electricity of the main house was considered to be a cost of poultry farming activity because the employee residing in the house was responsible for the grange and worked exclusively in the poultry farming activity.

The indirect costs with depreciation of the shed that houses the chickens and the dos equipment used in the activity totaled R$ 134,000,00; subtracting the residual value of R$ 22,800.00 there are R$ 111,200.00 to be depreciated. Applying the annual depreciation rate, we get the amount of R$ 7,790.00; divided into 12 months and multiplied by 6 months, the amount of the depreciation is R$ 3,895.00 for the period. This calculation was made because the period of collection and data analysis for the study was defined as 6 months. Next, the indirect costs of the activity were distributed into fixed and variable, in which the firewood used in the heater totaled R$ 2,200.00 and electricity R$ 2.068,20 – both were variable. Depreciation had been previously calculated and made available as a fixed cost, totaling R$ 3,895.00.

4.3.2 Direct Costs of the Poultry Farming Activity

In the property, only labor was observed to be a direct cost of poultry farming, considering that feed is provided by the company and the water consumed by the chickens is drawn from an artesian well in the property. The calculation was made so as to add wages to their respective charges during the study period. The monthly cost mensal of the employee is R$ 1,279.25, totaling R$ 7,675.50 at the end of six months. The expense of the activity is the ITR over the area occupied by the activity and by the home of the worker, which add up to R$ 57.37.

4.3.3 Total Variable Costs of the Poultry Farming Activity

Table 3 gives the total variable costs of the poultry farming activity. Table 3 demonstrates the total variable costs during the study period for the poultry farming activity, of R$ 4,268.20. Dividing the total cost by the area occupied by the grange, the cost per square meter was obtained, which totaled R$ 2.85 and which, according to the number of chickens at the end of the batch, which was 42 units/m², adding all six months, we verified that the cost per chicken was R$ 0.07.

Table 3. Total Variable Costs of the Poultry Farming Activity

Variable cost	Poultry farming activity
Total variable costs	4,268.20
Area Occupied by the Grange (m²)	1,500
Variable cost per m²	2.85
Final Average of Chickens per m²(Unit)	42
Variable cost per Chicken	0.07

Source: The research (2012)

4.4 Analysis and Presentation of the Results

4.4.1 Contribution margin (unit and total) of the Maize crop

The unit and total contribution margin of the maize crop shows how much each bushel of the product will contribute towards the profit. The sale price of the product is given by the market, which in the case was the co-op that received it. The value used was the retail price given by the co-op in the study period. The table below gives the contribution margin of the maize crop.

Table 4. Contribution Margin of the Maize Crop

Product	Market sale price (R$)	Variable cost (R$)	Variable expense (R$)	Unit contribution margin (R$)	Amount produced (Bsh)	Total contribution margin (R$)
Maize	23.50	11.8339	0.77	10.8960	10,666.20	116,219.73

Source: The research (2012)

Table 4 features the market price of the bushel of maize, of R$ 23.50, variable cost of R$ 11.83 per bushel and variable expense of R$ 0.77 per bushel – the latter referring to the fact that the co-op charges for services of intermediation, stocking and drying of the product. Subtracting all of these, the unit contribution margin was R$ 10.90 and, multiplying by total production, the total contribution margin was R$ 116,219.73.

4.4.2 Unit and Total Contribution Margin of the Poultry Farming Activity

Verifying the unit and total contribution margin of the poultry farming activity, it is possible to determine how much each chicken will contribute towards the profit. The price obtained with each chicken is calculated through the Production Efficiency Index (PEI), which is shown below, and then the contribution margin of the activity will be presented.

Table 5. Production Efficiency Index of The Grange Under Study

Average Daily Gain (Kg)	Viability (live chickens at the end of the batch) (%)	Feed Conversion (Kg)	Production Efficiency Index
0.067	97	1.55	417

Source: The research (2012)

On table 5, the PEI reached in the property was 417 points, which according to the analysis parameter table was an excellent production index, thus receiving high returns for the chicken in relation to the market. The owner informed that with this index, the slaughterhouse paid 0.60 per chicken unit, resulting in an average result of R$ 5,820.00 per flock. AS such, table 6 presents the contribution margin of the poultry farming activity for the property.

Table 6. Unit and Total Contribution Margin of the Poultry Farming Activity

Species	Market sale price (R$)	Variable cost (R$)	Variable expense (R$)	Unit contribution margin (R$)	Amount produced (Units)	Total contribution margin (R$)
Chicken	0.60	0.0677	-	0.5322	29,100	15,488.50

Source: The research (2012)

Table 6 shows the price paid per unit of chicken as R$ 0.60 and the variable cost as R$ 0.07. Thus, the producer obtained from the activity a contribution margin of R$ 0.53 per unit, which totaled R$ 15,488.50.

4.4.3 Confronting the Obtained Data

After all calculations were made to obtain the contribution margins of each activity, we next present the percentage that each activity contributed by occupied area, as the producer wishes to know whether it is viable to maintain the poultry farming activity, leave the area available for agricultural production, or yet, built new aviaries.

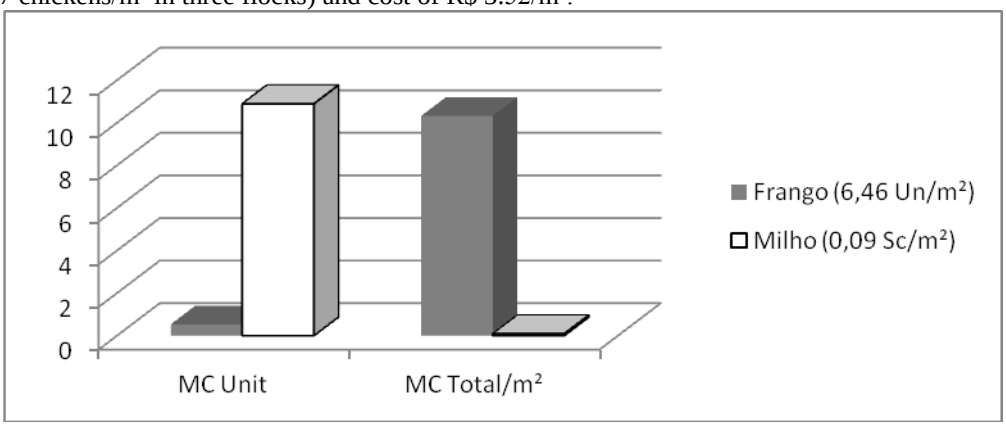
It should be noted that in order for this to happen, one must consider the cost-benefit of demolishing the shed, considering the value obtained from the machinery that will supposedly be sold in case this occurs, and the cost of mechanizing the land. In case new aviaries are built, it is necessary to assess the costs of building new sheds and the time required to cover the investments and then obtain a return, profit. Using the variable costing method, table 7 represents the demonstration of the result of each activity.

Table 7 Demonstration of the Results of the Agricultural (Maize) and Poultry Farming (Chicken) Activities

Demonstration of Results by the Variable Costing Method		
	Maize	Chicken
Gross Revenue	250,655.70	17,460.00
(-)Variable Costs and Expenses	134,435.97	1,971.50
(=) Contribution margin	116,219.73	15,488.50
(-)Fixed Costs and Expenses	9,985.80	11,627.87
(=) Profit in the Period	106,233.93	3,860.63
(=) Profit per hectare	866.51	
(=) Profit per unit		0.13
(=) Profit per m²	0.09	0.86
(=) Cost per m²	0.10	3.52

Source: The research (2012)

As seen in table 7, although the values of the maize crop were considerable higher than those of the poultry farming activity, in the end, the result presented by the poultry farming activity was surprising considering the area it occupies. When we divide the profits by the occupied area in square meters, the maize crop showed profit of R$ 0.09/m² and cost of R$ 0.10/m², whereas the poultry farming activity obtained a profit of R$ 0.86/m² (average of 6.47 chickens/m² in three flocks) and cost of R$ 3.52/m².



Source: The research (2012)

Graph 1 Comparison of the Contribution Margin of Each Activity per m²

When analyzing graph 1, it was detected that the maize crop has a much higher contribution margin than poultry farming when comparing each one by unit – one in bushels and the other in chicken units. However, when comparing each by the area it occupies, poultry farming has greater value than the maize crop – note that this comparison regards only the contribution margin of each activity.

The values found for the poultry farming activity in the contribution margin to cover fixed costs, and later the profit (as was the case), were R$ 10.32/m², compared to only R$ 009/m² maize crop. It should be noted that if compared to the same occupied area, the grange has a contribution margin of R$ 5.162,83 per flock over 1500 m², and that in six months

(three flocks) it amounts to R$ 15,488.50. For its part, the maize crop, over the same area, has a contribution margin of R$ 142.19.

To complement the information provided, by extracting the fixed costs from the contribution margins of each activity, the operational result of each activity over the same occupied area (1500 m²) was obtained. At the end of the months, the poultry farming activity has as operational result R$ 3,860.63, while the maize crop, on the same 1500 m², R$ 142.19 – reminding that the total of the maize crop showed an operational result of R$ 107,478.81. Comparing the activities of the property, it was noted that both activities showed a positive contribution margin, which means that both contributed to cover the fixed costs. The fixed costs of each activity do not surpass the contribution margin. Therefore, both activities brought profits and the producer can continue to perform his activities as usual, but the poultry farming activity has brought greater returns per occupied area.

5. Conclusıons

Cost accounting has become an indispensable tool for agriculture and poultry farming, as well as for their managers with regard to knowledge of their businesses, of the market and of the property for which they are responsible. In this perspective, this work aimed to apply the variable costing method and transform data into information that is useful to the manager of the rural property regarding the activities he performs in it. In that sense, it becomes extremely important to possess precise information, as he depends on several factors (not only internal ones) to reach positive results from his activities, considering that the main factor is the sale price defined by the market according to the quality of his products.

As a solution to the problem presented herein, it became clear that with the information provided by the variable costing method, the manager can gain greater control and consequently, better management over his property. Therefore, it is essential to have knowledge of the real production costs of his activities, as without knowledge of them he will not know the ideal price in order to turn a profit. Or yet, knowing he already reached the desired profit level, as in the case of the maize crop, hold on to the product to increase its profitability with a possible increase in the market price of the product.

During the development of the study, the owner followed the entire process and provided all desired information to carry out the required calculations, demonstrating keen curiosity in obtaining the final information for future decision making. Thus, it is seen that the objective proposed by the study – "apply the variable costing method in an agricultural and poultry farming property to assess the contribution margin per activity in order to aid the manager in his decision making" was fully fulfilled.

This statement was supported at the moment when all the costs of the activities undertaken in the property were analyzed bythe variable costing method in the period between March and August of 2012. Next, the results obtained with regard to the amount produced were analyzed to calculate the contribution margin of each activity – poultry farming and maize crop.

The contribution margin of each activity was calculated on a unit and total basis, in order to obtain a more thorough understanding. After the contribution margin of each activity was learned, a comparison was made between each, in order to find out the individual result per occupied square meter. With that information, the object of the case study was met, which was to discover which activity has the greater contribution margin per square meter; with that, if the manager decides to expand of the activities, he would know the margin required to cover his fixed costs.

As a final contribution, it is understood that this work serves as reference to cost management in specific rural activities, and is available to those interested and also for future studies to be carried out in this field.

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