Economic evaluation of milk production in family farm, with cattle feed with soybean meal

Cássio Renê Duminelli*, Reginaldo Ferreira Santos, Jair Antônio Cruz Siqueira, Natasha Barchinski Galant, Luciene Kazue Tokura, Carlos Eduardo Nogueira, Samuel Nelson Melegari de Souza and Wellington Lucas Tondo

State University of Western Paraná, UNIOESTE, Postgraduate Energy in Agriculture Rua Universitária, 2069 – CEP:85.819-130, Bairro Faculdade, Cascavel, PR, Brazil.

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Accounting can play an important role as a management tool, through information to enable planning, control and decision making, turning farms into companies with the capacity to monitor the evolution of the sector, especially with regard to the objectives and functions of financial management, cost control, crop diversification and comparison of results. Soybean meal, half-whole can be an excellent alternative to livestock dairy and beef cattle and pig farming. The study aims to evaluate the production of milk in function of soybean meal feed from cold press extruder. The study was conducted in São Miguel do Iguaçu, in a rural property. We evaluated eight animals, four of which received commercial feed and four soybean meal from extruder press. The cost of production and the simple payback was calculated and discounted. The payback was found as of year one.

Key words: Agriculture family, economic viability, dairy, soybean meal.

INTRODUCTION

Family farming has been strongly developed in the Brazilian context, due to current economy and in order, these producers can be sustainable and improve environmental conditions, agroecological alternatives are searched, such as: use of digesters, solar and photovoltaic energy, the development of biofuels and materials are re-used (Carvalho and Marin, 2016). With this, family farms can be defined as one in which the family, at the same time owns the means of production and takes the job in the establishment productive. The historical analysis of the Brazilian agricultural economy shows that dairy farming was the most penalized by public policies. The effects caused by price-fixing, are still alive in the memory of the producer. The agroenergy deals with the manufacture and use of the various types of biofuels, which are derived from activities in rural areas, such as agriculture, livestock and forestry (Wanderley, 1999).

Thus, the owner of the property is also the administrator; it is important to know the available resources on their property and adopt appropriate technologies that enable the producer to reduce costs.
ensure its sustainability and the permanence in the activity (Matos, 2002). According to Vilckas (2004), the development and implementation of planning in the rural sector is a major challenge, given that the enterprises in this sector are subject to many variables, such as the dependence on natural resources, the seasonality of the market, the perfectibility of products, the life cycle of plants and animals and the maturing time of the products. The country manager has the need for knowledge of natural resources, capital market knowledge validity of the products and their applications, to know biology and meteorology. The success of rural enterprise is not only high productivity through modern techniques, but also the control of production costs.

With regard to a sustainable alternative for family farming, there is the use of materials such as pie oilseeds which is a byproduct of oil manufacture and could be discarded and thereby can be used for other functions such as shows, Costa et al (2005), which used the sunflower pie to feed pigs in the growing-finishing phases, they found that the meal provided the same performance levels that the feed used. Already, Santos et al (2005) used the filter pie for the production of seedlings of vegetables and Furlan (2001) replaced the sunflower by soybean meal in feed for broiler chickens.

And for the feeding of ruminants, poultry and swine a study to replace the commercial food by soybean meal is being studied. This soybean meal has a good quality with high digestibility (Britzman, 2001), when in suitable moisture states according to Islabão (1986). The soybean composition is 38% crude protein, 82% total digestible nutrient and 20% oil, and due to these characteristics, its use is very viable for feed milk production and it can also be a rich source of energy in diets fattening bullocks (Harris Junior, 1990; Feijó, 1996).

The soybean meal is a protein source that currently has been widely used for animal feed; soybean meal represents about 79% of the soybean. During the oil extraction this process occurs, heating of soybean meal, which helps to increase their nutritional qualities (Thiago, Silva, 2003). In order to assist the development of sustainable practices and provide energy re-use in family farming, this work aims to evaluate the production of milk in feed function with soybean meal from extruder press cold.

MATERIALS AND METHODS

The experiment was conducted in the municipality of São Miguel do Iguacu located at latitude 25º 20'53" and longitude 54º 14'16" with an average altitude of 312 m and a population of 25,769 (IBGE, 2010), in a family farm which has the size of 11.1 ha or 4,586 acres. In this property, there is a creation of 30 dairy cows, which is the main activity besides cereal crops such as corn, and soybean where corn is used to feed cattle and soybean as part of crop rotation. To obtain the soybean meal it was used an extruder press of Bindigalvão mark (Figure 1), which extracts the extra virgin oil and therefore provides as residue the toasted meal ready for use in animal feed. The cost for the use of the machine in operation is R$ 1,50 per hour worked.

For the experiment it was used eight cows of the property. Four received the bran obtained from the extruder and four continued to receive the feed normally used in the property for a period of fifteen days. The composition of the commercial feed is shown in Table 1, while the soybean meal was produced from 60 kg from which 8 liters of oil were extracted and 52 kg of soybean meal. To facilitate understanding, the extruder feed will be called soybean meal produced by the extruder press and commercial feed. The economic feasibility analysis of the study was performed from the values of the project's cash flow, using economic indicators such as net present value, which takes into account the effect of time on the monetary values, using the average rate of attractiveness of 0.4583% per month, or 5.64% per year, which is the long term

Figure 1. Image of the cold extruder press which is extracting the oil and as a by-product produces the soybean meal. Source: www.bindgalvao.com.br.
Table 1. Description of commercial feed produced by the Cooperative LAR.

<table>
<thead>
<tr>
<th>Commercial feed (produced by LAR Cooperative).</th>
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<tbody>
<tr>
<td>Corn with up to 6% of flamed, up to 1% impurity and humidity up to 12%</td>
</tr>
<tr>
<td>Soybean meal 46% (Hypro)</td>
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<tr>
<td>Wheat with PH 80 and up to 1% of impurity</td>
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<tr>
<td>Tortuga Mineral Premix</td>
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<tr>
<td>Calcium phosphate</td>
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<tr>
<td>salt</td>
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<td>Limestone</td>
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Table 2. Description of values for the deployment of an extruder press, expressed in Reais (R$).

<table>
<thead>
<tr>
<th>Description</th>
<th>Amounts (R$)</th>
</tr>
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<tbody>
<tr>
<td>Machine Value</td>
<td>R$ 79,500.00</td>
</tr>
<tr>
<td>10x10m Shed value</td>
<td>R$ 70,000.00</td>
</tr>
</tbody>
</table>

interest rate - TJLP set by the Central Bank of Brazil (FEDERAL REVENUE BRAZIL, 2011) and payback, which shows the time to raise the capital invested. For the project, it was used the average of the balances of cash flows of nine years, discounting the last year as it has the return of the residual value of goods and machines.

RESULTS AND DISCUSSION

Table 2 shows the values for the deployment of the extruder press, whereby the press and a 10x10 m shed for the accommodation of the machine is necessary, in this case the property value is also considered. For biodiesel production physical labor will be required, that is, a person per day. For the cost of feed production in the press 5.5 kw/bag is spent with power X R$ 0.18 = R$ 0.99. Machine energy cost in operation approximately of R$ 1.50 per hour worked. In Figure 2, it can be seen, the final result of milk production with soybean meal and the commercial feed. The production was between 309 to 371 liters with the average of 338.5 L in fifteen days, with two daily milk collections and when compared to the other meal it is observed that feeding with the soybean meal increased milk production. The animals fed with the diet type 1 produced 1354 L while the diet type 2 animals produced 959 L in fifteen days. This result disagrees with Garcia et al. (2006) that found that, introducing the sunflower meal in ruminant feed was not influential in consumption and weight gain.

The average production of industrial feed was 239.75 liters, varying in 358 to 177 liters of production. Restle et al. (2004) tested the exchange of sorghum grain by soybean hull, where there was an increase in weight gain and reduced feed conversion that can be explained by the improvement in the rumen, thereby making better use of the fiber. About the waste of biofuels industry Almeida (2005) noted that in dairy cows using babassu bran oil residue, it increased milk production and improved economic feasibility, when 20% of soybean was added. To Paulino et al. (2006b) supplementation with soybean provided mass gains of 0.140 Kg/day compared to supplementation with mineral mix, promoting bigger production per area, less time occupation of pastures and working capital, according to the authors, whole grains can also be used without impairing the productive performance and may even minimize processing costs.

Since Torres et al. (2003) tested the addition of sugarcane bagasse to dairy cattle feed, bagasse increases dry matter intake, the accuracy level should be used in accordance with the performance and economics, but weight gain is decreased. The animals fed with diet type 2 had production of less than 29.17% that the animals fed with diet type 1, as shown in Figure 2. Halachmi et al. (2004) replaced corn silage by soybean hulls and it was observed, an increase in milk production in 38.5 Kg/day with soybean and 36.3 Kg/day and corn silage, it was also observed an increase in total production of fat for the diet. Thus, Paulino et al. (2002) found no difference in weight gain in animals when compared two soy supplements (one with whole grains and the other with soybean meal) in the finishing phase, but found an increase in carcass yield which was 52.96%. Silva Neto and Basso (2005) stated that the consolidation of dairy farming for family production is fundamental to present a regular source of income and especially by the extent in terms of market. Thus, the competition at low levels means that milk production is still an option for a large number of producers (Wilkinson, 1997).

In simple payback for commercial feed the return is then obtained in the first year in 1 year and 2 months, the investment can be considered satisfactory as per the return. The project evaluation involves a set of techniques that seek to establish viability parameters, usually these parameters are described by the payback (Bruni, Frama and Smith, 1998). As for the extruder feed payback is over 9 months and 24 days. As shown in Figure 2, the initial investment is R$ 149,500.00 and can yield profits of up to R$ 700,000.00 for the use of soybean meal, giving a difference of R$ 295,000.00 gain when compared to the commercial feed gain. Non-exact methods (Casarotto and Kopittke, 2010) or criteria in current terms (Buarque, 1989) do not consider the effects of time on the money value. The main methods in this category are: simple payback, simple profitability and cost-benefit ratio in current terms (not updated) as shown in Figure 3. With the discounted payback indicator, there is the payback times using commercial feed throughout the year 2 and the extruder feed over 1 year, as can be seen in Figure 4. To Britzman et al. (2001), the discounted payback period is the number of years
Figure 2. Total milk production using conventional soybean meal and soybean meal obtained from cold press extruder.

Figure 3. Graph showing the relation of the simple payback of the two types of feed. Amounts in reais.

Figure 4. Payback discounted the commercial and extruder feed. Values represented in Reais (R$).
required to recover the investment of the net flow of discounted cash.

In the case of payback discounted, there are the current investment values targeting the data on the net present value, and then, there are the recoveries of investments using soybean meal produced by the extruder press, where the return will be in the first year since the great increased productivity. According to Assaf Neto et al. (2005) it is in the payback recovery period of investment and identification that the capital made is recovered by means of cash flows. Brigham and Houston (1999) state that the lower the cost of the project the best for the investor. According to Braga (1989) the lower the period of investment recovery the lower the risk.

Conclusions

1. The return through the simple payback comes through 9 months and 24 days for the extruder feed.
2. The initial investment of the producer for the implementation of oil extraction is high, but the discounted payback period is from year one.
3. Animals fed the soybean meal diet produced 1354 liters while animals fed with commercial feed produced 959 liters in fifteen days of the experiment.

Conflict of Interests

The authors have not declared any conflict of interests.

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