

Economic-Financial Analysis of a swine farm in Rosales Chihuahua

Análisis Económico-Financiero de una granja porcina en Rosales Chihuahua

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Abstract

Pig cattle are characterized by their high productive capacity and adaptability to different environmental and climatic conditions. The present work was carried out in the Municipality of Rosales, Chihuahua with the purpose of knowing the economic and financial feasibility of an investment project for a small backyard pig farm with six females of the Landrace breed and one male of the Duroc breed. The marketing of pork will be through local butcher shops and chorizo processors in nearby communities. The management of the herd was designed with emphasis on nutrition and health. The results of the economic and financial analysis showed a positive evaluation of the IRR and the NPV, and the benefit-cost relationship was obtained, which also yielded a viable result for its implementation.

Pigs, Costs, Micro Business, Financial Evaluation

Resumen

El ganado porcino se caracteriza por su alta capacidad productiva y adaptabilidad a diferentes condiciones ambientales y climáticas. El presente trabajo se realizó en el Municipio de Rosales, Chihuahua con el propósito de conocer la factibilidad económica y financiera de un proyecto de inversión de una pequeña granja porcina de traspatio de seis hembras, de la raza Landrace y un macho de la raza Duroc. La comercialización de la carne de cerdo será a través de las carnicerías locales y a los procesadores de chorizo de las comunidades cercanas. Se diseñó el manejo de la piara haciendo énfasis en la nutrición y la sanidad. Los resultados del análisis económico y financiero mostraron una evaluación positiva de la TIR y de la VAN, así mismo se obtuvo la relación beneficio-coste que también arrojó un resultado viable para su realización

Ganado porcino, Costos, Micro Empresa, Evaluación Financiera

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Introduction

Pigs (*Sus scrofa domesticus*) have been raised in the world by humans in order to produce and obtain their meat for food, as well as to distribute, trade and exchange goods. Pig farming in Mexico is one of the main economic activities of the livestock sub-sector, pork consumption ranks third nationally and represents the productive activity with the highest intake of fodder grain production (Alarcón, *et al.* 2005). Mexican pig farming dates back to the 16th century, when the Spanish introduced European and Asian pigs. These species, in their uncontrolled production, gave rise to Criollo pigs. In this way, Criollo pigs spread throughout Mexico until the importation of Duroc and Poland China breeds in the 20th century (Hernández, 2017).

In social strata with limited purchasing power, they have been considered as a piggy bank and take advantage of their ability to consume products such as kitchen, restaurant, harvest or agro-industrial waste, which are transformed into proteins, fats, carbohydrates, vitamins and minerals of great nutritional importance for humans.

Pork generates significant income for producers who offer the product to the domestic market, and there are producers who obtain significant profits when they place the product on the international market (Pesado & Rodríguez de Jesús, 2020).

From an animal behavioural point of view, the pig species in collectivities is a species with a strong hierarchical character that is also linear. This behaviour has been corrected, thanks to the individualised housing of sows, which, in addition, aided by computerised management systems, has allowed the needs of the pregnant sow to be carefully controlled, considerably increasing production yields and efficiency (Ministry of Agriculture, 2012).

Factors that have determined the low pig population in Latin America are the pig's competition with humans for grain, the existence of extensive natural pastures suitable for cattle farming, and the difficulty of preserving pork.

However, over time, the pig has been transformed from a very rustic animal into a highly efficient animal for transforming food, mainly grain, into animal protein of high biological quality.

In this respect, it is worth noting that pigs yield up to 75% of meat in carcasses and that this yield is higher than that of cattle. Pigs after being genetically improved and fed balanced rations produce a lean carcass with a lot of meat. In addition, when pigs are properly managed, the incidence of diseases and parasites is relatively low. Due to the short production cycle of pigs, a pig farmer can raise his pigs from birth until they reach 100 kg of weight at an age of 6-7 months, with a feed conversion ratio of approximately 3.5 kg of feed per kg of live weight gained, which is economically attractive (Alarcón, *et al.* 2005).

Methodology to be developed

For the development of this study, a qualitative and descriptive approach was applied because there is little information and research on technified and semi-technified farms in the municipality of Rosales Chihuahua, the project was developed in the period from January to December 2022 to obtain information that will help the establishment of small farms that do not require much investment capital and as a viable alternative to provide their own food at low costs for small producers in the community, in addition to its inductive and suggestive nature, similarities can be found with others, which makes it possible to understand the processes, changes and experiences. It is descriptive because it identifies and analyses the research problem and integrates it into a holistic concept in terms of concepts and variables. For the financial indicators, the methodology of project formulation and evaluation was followed.

Economic and financial analysis

With the information obtained, an economic-financial analysis was carried out using the formulas of the financial indicators Net Present Value (NPV), Internal Rate of Return (IRR) and Benefit Cost (B/C). A three-year projection of revenues and costs was made and the break-even point was calculated.

Results

The results are shown according to the project formulation and evaluation methodology, answering the following questions:

What was done? What was needed? What was obtained?

- Identify the elements and characteristics for the infrastructure and size of a pig farm for meat production.
- Visit the established semi-technified backyard and backyard pig farms in the municipality of Rosales.
- Collect materials to be used for construction.
- Consult on farm designs on internet sites Information regarding the construction and design of the farm, for the elaboration of the corresponding plan.
- The design to be used in the construction of the farm.
- Determine the commercial opportunities for pigs in the municipality of Rosales by carrying out a market study.
- To carry out a market study in the region of Rosales.
- Physical design of the farm.
- Electrical design.
- Plumbing design.
- Graphs of the demand of the consumption of pork meat in the butcher's shops of the Rosales region.
- Pork price graphs.
- Design the technical and financial study of the project and its profitability.
- Obtain a budget for the construction of the farm - Physical design of the farm.
- Electrical design.

- Plumbing design.
- Feasibility of the financial study of the farm.
- Feasibility of the technical study of the pig farm.

Project equipment and infrastructure

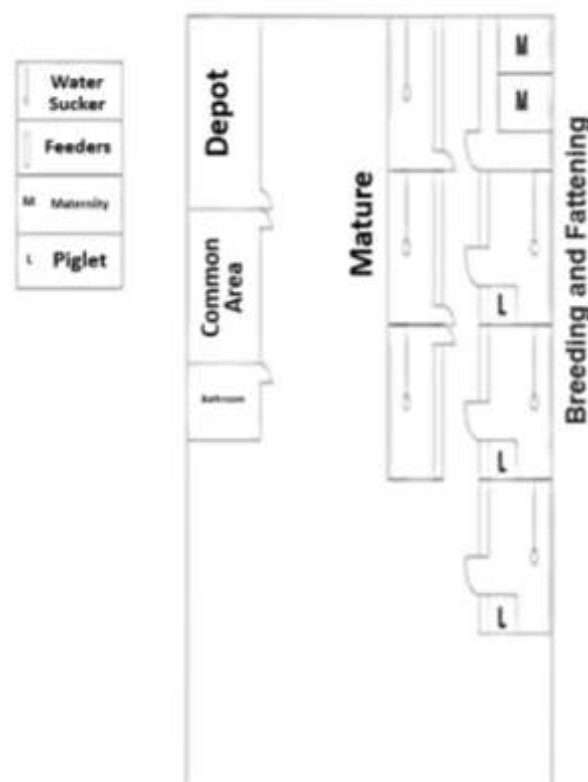


Figure 1 Backyard pig farm design

Market study

Demand analysis

The business being located on a farm near Rosales, Chihuahua, emphasised the nearest points of sale, so a survey was carried out of 40 butcher's shops closest to its location, which are in the municipality of origin and in the neighbouring towns of Meóqui and the western part of Delicias. The results obtained from the surveyed potential customers show that 100% of the pork traders do not have a fixed meat supplier, In terms of the frequency with which they place their orders, it was found that the majority of them buy the product on a weekly and fortnightly basis, with 55% and 38% respectively, which is based on the needs of their clientele.

Among the product that is mostly consumed by the customers of the establishments, it was indicated that the majority buy more than one carcass with 55% and a complete carcass with 33%, showing again the importance of consumer demand at the established points. Competition in the market for pork consumption has remained present in recent times, and the results showed the range of prices at which the suppliers sell the product, with the majority of the traders mentioning that it is between \$65.00 and \$70.00.

The businesses close to the distribution point, being open to new suppliers in order to maintain the supply and quality of their products to consumers, require, according to the analysis, that the farm generates a monthly quantity of 1500 kg per month to satisfy the demand of the establishments, which is equivalent to 10% of the market, which is considered a mature market.

Financial study

For the financial study we compiled the information required for the creation of the farm taking as support the scale of production and the infrastructure shown in the plan, this result indicates that an initial capital of \$450,800.00 pesos is necessary.

Concepts	Unit	Quantity	quantity unit	Cost amount	Partners	Program	Total
Assets							
Land	part	1	\$ 90,000.00	\$ 90,000.00		\$ 90,000.00	\$ 90,000.00
Construction	part	1	200,000.00	\$ 200,000.00	\$ 200,000.00		\$ 400,000.00
Pigs bellies	parts	6	\$ 8,300.00	\$ 49,800.00	\$ 49,800.00		\$ 99,600.00
Stallion	part	1	\$ 10,000.00	\$ 10,000.00		\$ 10,000.00	\$ 10,000.00
Maternity cages	parts	2	\$ 15,000.00	\$ 30,000.00	\$ 30,000.00		\$ 60,000.00
Ducker drinkers	parts	10	\$ 50.00	\$ 500.00	\$ 500.00		\$ 1,000.00
Fridge	part	1	\$ 4,500.00	\$ 4,500.00		\$ 4,500.00	\$ 4,500.00
				\$ 344,800.00	\$ 294,800.00	\$ 50,000.00	\$ 689,600.00
Deferred assets							
Training and technical assistance	budget	3	\$ 30,000.00	\$ 90,000.00	\$ 90,000.00		\$ 180,000.00
Working capital							
Medicine, gloves, sprays (SUPPLIES)	batch	1	\$ 10,000.00	\$ 10,000.00	\$ 25,850.00	\$ 15,850.00	\$ 51,700.00
Labor (WAGES)	work	4	\$ 1,200.00	\$ 4,800.00	\$ 4,800.00		\$ 9,600.00
Administration	serv	1	\$ 300.00	\$ 300.00		\$ 300.00	\$ 300.00
Water	serv	1	\$ 200.00	\$ 200.00		\$ 200.00	\$ 200.00
Light	serv	1	\$ 500.00	\$ 500.00		\$ 500.00	\$ 500.00
Subtotal				\$ 16,000.00	\$ 25,850.00	\$ 9,850.00	\$ 51,700.00
Total				\$ 450,800.00	\$ 410,650.00	\$ 69,850.00	\$ 931,300.00

Table 1 Initial investment budget

In order to better represent the project, we sought to reflect the costs that the farm will have in its first year, taking into account fixed and variable costs in order to consider the disbursements that will generate the liabilities, which will be recurrent in this process and to be able to make an estimated projection of three years, the calculations are shown in table 2 as total costs.

FIXED COSTS	YEAR 1	YEAR 2	YEAR 3
Water	\$ 4,800.00	\$ 4,848.00	\$ 4,896.48
Light	\$ 6,000.00	\$ 6,060.00	\$ 6,120.60
Wages	\$ 57,600.00	\$ 58,176.00	\$ 58,757.76
Administration	\$ 96,000.00	\$ 96,960.00	\$ 97,929.60
Permissions	\$ 12,000.00	\$ 12,000.00	\$ 12,000.00
TOTAL	\$ 176,400.00	\$ 178,044.00	\$ 179,704.44

COSTOS VARIABLES	YEAR 1	YEAR 2	YEAR 3
MEDICINES	\$ 12,000.00	\$ 12,120.00	\$ 12,241.20
TOTAL	\$ 12,000.00	\$ 12,120.00	\$ 12,241.20

	YEAR 1	YEAR 2	YEAR 3
FIXED COSTS	\$ 176,400.00	\$ 178,044.00	\$ 179,704.44
VARIABLE COSTS	\$ 12,000.00	\$ 12,120.00	\$ 12,241.20
TOTAL COSTS	\$ 188,400.00	\$ 190,164.00	\$ 191,945.64

Table 2 Total costs of the business over a 3-year period

In the projection of income that the farm will reflect from the data collected, of which the amount 1,500 kg that this will generate to meet the needs of butchers and their customers, as well as the unit price per kilo will be \$ 87.07 as income of the product in the market, to generate a competitive advantage and meet production costs.

Concept	Volume	Price	Sale	Year		
	Monthly sale	UNIT	ONTHY	1 (4 months)	2	3
Channel	1,500.00	\$ 87.07	\$ 130,605.00	\$ 522,420.00	\$ 548,541.00	\$ 575,968.05

Table 3 Projected income of the project over a period of three years

It is worth mentioning that all the assets owned by the business can be used in the future as down payments for technological improvements such as new equipment or services, a depreciation estimation calculation was made, which will help in making future decisions as mentioned above.

Fixed assets	Original value	Depreciation costs				rescue value
		Rate	years	annual dep		
Construction	\$ 200,000.00	10%	5.00	\$ 20,000.00	\$ 100,000.00	
Pigs bellies	\$ 49,800.00	10%	5.00	\$ 4,980.00	\$ 24,900.00	
Stallion	\$ 10,000.00	10%	5.00	\$ 1,000.00	\$ 5,000.00	
Maternity cages	\$ 30,000.00	10%	5.00	\$ 3,000.00	\$ 15,000.00	
Ducker drinkers	\$ 500.00	10%	5.00	\$ 50.00	\$ 250.00	
Fridge	\$ 4,500.00	10%	5.00	\$ 450.00	\$ 2,250.00	
Total	\$ 294,800.00			\$ 29,480.00	\$ 147,400.00	

Table 4 Product depreciation costs per year

In this way and taking into account all the expenses and income that the farm will have, the profit and loss statement was calculated to show the profits that the business will generate covering its needs per year, having in the first year an estimated profit of \$237,204.55, this will have an approximate average increase per year of \$18,500.00.

CONCEPTS	AÑO 1	AÑO 2	AÑO 3
(+) SALE	\$ 522,420.00	\$ 548,541.00	\$ 575,968.05
FIXED COSTS	\$ 176,400.00	\$ 178,044.00	\$ 179,704.44
VARIABLE COSTS	\$ 12,000.00	\$ 12,120.00	\$ 12,241.20
(-) TOTAL COSTS	\$ 188,400.00	\$ 190,164.00	\$ 191,945.64
(=) GROSS PROFIT	\$ 334,020.00	\$ 358,377.00	\$ 384,022.41
(-) DEPRECIATION	\$ 29,480.00	\$ 30,954.00	\$ 32,501.70
(=) PREVIOUS TAX PROFIT	\$ 304,540.00	\$ 327,423.00	\$ 351,520.71
(-) TAXES	\$ 67,334.45	\$ 71,717.15	\$ 77,309.15
(=) PROFIT FOR THE YEAR	\$ 237,205.55	\$ 255,705.85	\$ 274,211.56

Table 5 Income statement of the project over a period of 3 years

The cash flow obtained shows the starting year of the construction and activities, the result showed a negative balance since in this year only the initial investment will be used to cover the expenses that the farm requires to start up, such as services, infrastructure, food and unforeseen events. The years after this is when the generation of income begins, generating a significant balance in favour that is used to reinvest in the business and thus project a growth in the number of pigs for fattening and fattening, as well as planning for expansion on the land.

CONCEPTS / YEAR	YEAR 0	YEAR 1	YEAR 2	YEAR 3
(-) SALES	\$ -	\$ 522,420.00	\$ 548,541.00	\$ 575,968.05
(-) RESCUE VALUE	\$ -	\$ -	\$ -	\$ 147,400.00
(=) TOTAL INCOME	\$ -	\$ 522,420.00	\$ 548,541.00	\$ 723,368.05
FIXED COSTS	\$ -	\$ 176,400.00	\$ 178,044.00	\$ 179,704.44
VARIABLE COSTS	\$ -	\$ 12,000.00	\$ 12,120.00	\$ 12,241.20
(=) TOTAL COSTS	\$ -	\$ 188,400.00	\$ 190,164.00	\$ 191,945.64
PURCHASE FIXED ASSET	\$ 394,800.00	\$ -	\$ -	\$ -
PURCHASE DEFERRED ASSET	\$ 30,000.00	\$ -	\$ -	\$ -
PURCHASE WORKING CAPITAL	\$ 30,000.00	\$ -	\$ -	\$ -
(=) FINAL BALANCE	\$ 394,800.00	\$ 60,780.00	\$ 297,597.00	\$ 829,019.41

Table 6 Cash flow over 3 years

Explained in another way through a break-even calculation, it indicates that the first year to generate profit and cover the needs of the farm and the animals is 37% of the sales of CANAL pork in the first year, 36% in the second year and 34% from the third year onwards.

CONCEPTS / YEAR	YEAR 1	YEAR 2	YEAR 3
SALES	\$ 522,420.00	\$ 548,541.00	\$ 575,968.05
FIXED COSTS	\$ 176,400.00	\$ 178,044.00	\$ 179,704.44
VARIABLE COSTS	\$ 12,000.00	\$ 12,120.00	\$ 12,241.20
TOTAL COSTS	\$ 188,400.00	\$ 190,164.00	\$ 191,945.64
BALANCE POINT \$	\$ 180,547.17	\$ 182,066.76	\$ 191,953.18
BREAK-EVEN %	37%	35%	33%

Table 7 Break-even point of the project over a period of 3 years

Finally, a profitability analysis was carried out, where an NPV of \$473,068.97 was obtained, indicating that, being a number greater than zero, it will have an extra profit, satisfactorily covering its production and service costs. Another indicator is the IRR which is compared with a viability rate of 10% used in accounting exercises, exceeding it and proving to be a viable project and finally the Benefit/Cost (B/C) analysis of c1.51, which indicates that for every peso invested in the business, it will return 51 cents.

YEAR	0	1	2	3
Project Flow	-394,800	-60,780	297,597	829,019.41
Net Worth	675,536.41			
Refresh Rate	0.076660211	TREMA	10	
Refresh Factor	1	0.928798139	0.862665982	0.801242559
Updated Project Flow	-394,800	-56,452.35087	256,726.8084	664,245.6334
Sum of the updated project flow	473,068.96	10.000%	Net Present Value	VNP
VNP	\$473,068.96			

Table 8 Results of the profitability analysis

According to the results obtained from the NPV of \$473,068.97, the IRR of 57.47% and a Benefit Cost of 1.51, it is concluded that the project is profitable and feasible to implement due to its short construction duration and recovery of investment costs.

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