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ECONOMIC STUDY THROUGH SIMPLE INDICATORS, OF SHEEP FATTENING IN AN INTEGRAL FARM IN THE STATE OF PUEBLA, MEXICO

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Abstract: The objective of this study was to know the economic profitability of an integral farm located in the state of Puebla, Mexico. 1000 sheep of 20.0 kg live weight on average, hybrids (F1), with 2 to 3 months of age were used. The animals were finished with a diet high in grains (90 %) and forage (10 %). The economic indicators were analyzed to know the profitability, the investment required was $1,517,295.40for fattening, which included; fixed and variable costs, depreciation was calculated in $126,522.00annualand $23,430.00 for fattening. The total income from the sale of 995 sheep of 40 kg live weight was $1,830,800.00. The net income per invested peso was 1.16, the accounting rate of return per fattening was 15.8 % and the net rate of return per year was 85.32 %. It is concluded that the fattening of sheep in an integral farm, under the conditions of this experiment, has an annual profitability of more than 80 %.
Keywords: Fixed costs, Variable costs, Conversion, Intensive fattening, Profitability.

INTRODUCTION

Currently, Mexico has a deficit in sheep meat production, currently more than 60% of the meat consumed annually is imported (García 2005). The national sheep population has increased in recent years, from 7.2 million head in 2006 to 8.7 million head in 2020 (SIAP 2020). This data indicates that the average annual growth rate is still insufficient to cover the demands, this leads to improving the productive efficiency of the species (Hernández 2003; Diaz et al. 2018). The price of live sheep has increased in recent years, it is a profitable business andproduces less methane and effluents that pollute the environment (Gonzalez et al. 2013: Rodriguez et al. 2017). Its economic viability revolves around the price of the inputs, since food represents more than 80% of the costs (Camacho et al. 2018). Various factors affect, such as; Inadequate

nutrition, sanitary deficiencies, low genetic quality of herds, inadequate transfer and low adoption of technology (Diaz et al. 2018). This makes it necessary to continue looking for profitable alternatives that allow increasing production. (Macedo and Castellanos 2004).

GOAL

The objective of this study was; carry out an economic analysis of a sheep fattening in an integral farm, to know the profitability per fattening and per year.

MATERIAL AND METHODS
LOCATION

The research was carried out at Racho La Excelencia, in Tlacotepec de Benito Juárez, Puebla, Mexico.Located at km 56.7 of the Puebla - Tehuacán highway Geographically it is located at a north latitude of 18° 52'57", and a west longitude of 97° 43'49", at an altitude of 2055 masl, the predominant climate is temperate semi-dry with rains in summer, with an average annual rainfall of 700 mm and an average temperature of 18 °C (García 1988).

The ranch's main activity is the production of lambs for supply, as well as purebred bellies and stallions, which are marketed nationwide.

ANIMALS USED

To carry out this economic analysis, 1000 sheep produced on the same ranch were used, after being weaned with an average live weight of 20.0 kg, with F1 genotype (wool stallions with hair bellies) and ages between 2 to 3 months, which were subjected to completion in a corral for 67 days, through the management and nutrition protocol that has been implemented on the farm.

NUTRITIONAL MANAGEMENT

Nutrition represents the most important component in production costs, after the cost of the lamb itself, and determines the productive behavior of the animals. (Martínez de Acurero et al. 2002; Rodríguez et al. 2017). Only finishing diet was used, high in grains (concentrate; 90% and 10% forage), with metabolized energy content of 2.8 Mcal kg MS-1; crude protein 14.5%, crude fiber 10.0%, Calcium 0.80 and Phosphorus 0.41%, the food was homogenized by mixing to offer a comprehensive diet and water ad libitum. (Mendoza, et al. 2007). The animals had a previous period of adaptation of the ruminal microflora to reduce the incidence of metabolic problems, (Muñoz et al. 2020).

SANITARY MANAGEMENT

At the start of fattening, the sheep are dewormed,Vitamin A, D, E and Se are applied, they are bacterinized against Pasterella spp, Clostridium perfingens type C and D to reduce the incidence of enterotoxemia, very common in sheep feedlots (Germani et al. 2022)..

Economic analysis and study variables.

The economic evaluation of the fattening corresponds only to a fattening operation lasting 67 days. For this purpose, evaluation methods were used that do not consider the value of money over time, with the estimation of the following indicators (Sosa et al. 2000; Hernández 2003).

1. Simple gain: It was calculated by subtracting total costs from total revenue.

2. Income by invested peso: It was estimated by dividing total revenue by total costs.

3. Accounting rate of return: It was estimated by dividing the total profit between the total costs, it was multiplied by 100 to express it as a percentage.

4. Annual profitability: Accounting rate of return multiplied by the number of

fattenings carried out in a year.

The indicators were calculated and presented per lamb and per fattening of 1000 lambs.

RESULTS

The minimum investment in fixed assets that the feedlot required was $1,551,200.00. The annual depreciation was calculated at $126,522.00 (table 1), and $23,430.00 per fattening, since 5.4 fattenings are carried out in a year with periods of 67 days of completion for fattening. The average feed consumption per animal was 1.5 and the feed conversion was 5.03 kg, the other technical data can be seen in table 2. The total operating costs were1,517,295.40 (Table 3). The net gain per invested peso was 1.16, the accounting rate of return was 15.8 and the annual return was 85.32 (Table 4).

THE FOLLOWING CATEGORIES ARE CONSIDERED IN FIXED COSTS:

1. Salary. Two workers are considered for a normal shift and one more for a special shift (Sunday, holidays and night watchman) with a base salary of three minimum wages each, plus insurance costs, FOVISSTE, vacation bonus and Christmas bonus. In addition, the salary of a technician in charge of the feedlot is considered with a base salary of 5 minimum wages plus the aforementioned legal benefits, the cost for salaries amounts to $101,727.2 per feedlot.

2. Maintenance. For facility maintenance, a cost of $19,473.34 per fattening was considered. For equipment maintenance, a cost of $7,792.84 per fattening is being considered.

IN VARIABLE COSTS THE FOLLOWING CATEGORIES ARE CONSIDERED:

1. Lambs.A purchase price of $46.00 kg of LW is considered with an initial weight of 20 kg on average and therefore a cost of $920.00 per lamb.

2. Food. The feed cost amounts to an average of $4.18 per kg and $420.09 per lamb fattened in the 67 days of the fattening period.

3. Medicines and vaccines. For this concept, there is a cost of $30.27 per fattened lamb, and considers the deworming, bacterin, implant, antibiotic and other concepts. For fattening the item was $30,270.00.

4. Other variable costs. For fuel, electricity and water, joint costs of $15,840.00 per fattening and $15.84 per lamb are contemplated. For the total estimate of the operating costs per fattened lamb, a cost associated with mortality of $9.18 per lamb was considered.

For the estimation of the operating costs, the interest costs of the working capital and depreciation of the fixed assets during the period of a fattening are also contemplated. An annual depreciation of the fixed assets of$126,522.00per year adjusting to the fattening period results in $21,224.00.

DISCUSSION

The technical parameters obtained in this fattening of 1000 lambs (table 2), are considered acceptable and are in accordance with what was reported by (Sánchez 2005 and Muñoz et al 2022) and it is what guarantees that the profitability of these production systems is adequate. The age, weight and genotype of the lambs at the beginning of intensive fattening are considered optimal

for the sheep to achieve the best efficiency in daily weight gain and feed conversion and as indicated (Camacho et al. 2018; Muñoz et al. 2022). The observed mortality (0.5%) in the 67 days of fattening is considered low and may be the result of fattening the animals produced on the same farm and is different from what was reported by (Camacho et al., 2018), who reportedb1.

In (table 4) the financial statement of the results is presented, considering as income: the sale of lambs at a price of $46.00 per kg of LW or $1840.00 per lamb on average. The operating costs are separated into fixed costs and variable costs. The estimated financial results statement per lamb and per pen for a fattening is also presented in table 3. In the feedlot the total net cost of fattening amounted to $1,524.92 per lamb and $1,517,295.40 per pen for a fattening operation of 1000 lambs, while income from the sale of lambs was $1,840.00 per lamb and $1,830,800.00 per fattening, generating a net balance sheet of $305.11 per lamb and $303,588.80 for each fattening. Net income per peso invested (benefit-cost ratio) was estimated at 1. 16 and is similar to that reported by Muños et al. (2022), which means that for each invested peso, 16.12 cents are obtained per fattening; the net accounting rate of return was 15.8 % per fattening. Considering a fattening period of 67 days for this production system; the number of fattenings per year was 5.4; therefore, the net accounting rate of return per year was 85.32%. With the values obtained for these estimators, it can be inferred that fattening lambs in stables on an integral farm is economically profitable, since Camacho et al. (2018), reported an annual profitability of 35.26 % in finished lambs but collected from different sources. the net accounting rate of return was 15.8 % per fattening. Considering a fattening period of 67 days for this production system; the number of fattenings per year was

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CONCLUSION

The analysisThe economic analysis carried out with simple estimators for a fattening of lambs in stables in an integral farm, is profitable with an accounting rate of return greater than 80% per year.

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CONCEPT	Amount	PU ($)	Amount ($)	Useful life (Years)	Depreciation ($/year)
FACILITIES					
Warehouse for inputs	200 m2	1,056.00	211,200.00	twenty	10,560.00
fodder cellar	300 m2	890	267,000.00	twenty	13,350.00
corrals	1200 m2	352	422,400.00	fifteen	28,160.00
water cistern	20 m2	2,112.00	42,240.00	twenty	2,112.00
house/table	50 m2	1,936.00	96,800.00	twenty	4,840.00
molasses tank	1	17,600.00	17,600.00	10	1,760.00
hammer mill	1	44,000.00	44,000.00	10	4,400.00
weighing machine	1	10,560.00	10,560.00	10	1,560
feed mixer	1	44,000.00	44,000.00	10	4,400.00
Vehicle	1	237,000.00	237,000.00	10	23,700.00
feeders	twenty	5,280.00	105,600.00	5	21,120.00
drinkers	twenty	1,760.00	35,200.00	5	7,040.00
Tools	1	17,699	17,600.00	5	3,520.00
			1,551,200.00		126,522.00

Table 1. Investment in fixed assets

CONCEPT	PARAMETER
sheep for fattening	1000
Race	F1 hybrids
starting weight	20.00 kg
Age in (months)	2 to 3
final live weight	40.00 kg
Mortality	0.50%
Feed consumption kg d-1	1,509
Feed cost $ kg-1	4.18
Daily weight gain g d-1	298
feed conversion	5.03
Fattening period (d)	67
Purchase price $ kg-1	46

Sale price $ kg-1		46

Table 2. Technical parameters of the fattening of stabled sheep

INCOME:	per lamb ($)	Per fattening ($)
by sale	1,840.00	1,830,800.00
EXPENSES:		
Fixed costs:		
Salary	102.23	101,727.20
facility maintenance	19.57	19,473.34
equipment maintenance	7.83	7,792.84
SUBTOTAL	**129.63**	**128,993.38**
Variable costs:		
lambs	920	920,000.00
Feeding	420.09	417,989.55
Medicine	30.27	30,270.00
Fuel	5.56	5,561.60
Electricity	7.84	7,784.00
Water	2.44	2,440.00
cost per mortality	9.18	9,180.00
SUBTOTAL	**1395.38**	**1,388,313.50**
TOTAL COST OF OPERATION	**1,524.92**	**1,517,295.40**

Table 3. Operating costs.

CONCEPT	PER SHEEP ($)	PER FATTENING ($)	
Balance of income and expenses	305.11	303,588.80	
Interest payment	34.87	34,870.00	
Depreciation	21.33	21,224.00	
Total net cost of operation	1581.5	1,573,593.32	
Income balance of fattening	248.88	247,637.19	
Net income per peso invested			1.16
Accounting rate of return per fattening			15.8
Net accounting rate of return per year			85.32

Table 4. Balance of income and expenses