An Economic Evaluation of a Prospective Horse Breeding Business

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of a

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Introduction

Purpose

The purpose of this economic analysis project is to determine the profitability of a horse breeding business. The project specifically considers breeding the Paint variety of horse. The finest Paint horses are known for their striking brown/white or black/white colors. The objective is to breed horses for color, since the horses with the most brilliant colors are obtain the highest sales prices.

This type of business would cater to the Western Pleasure horse enthusiast. The typical customer would use the horses for either pleasure riding, showing, 4-H, or a combination of the three.

This analysis is of use to the prospective horse breeder. It is assumed they already have land as a part of their primary residence and an interest in horses. This is also assumed to be a part time undertaking.

Significance to Engineering Management

related to cost management

The project does not have a direct connection to engineering management. However, many of the concepts encountered in this problem come up in economic problems related to engineering management. One example is the risk involved in whether or not the foal (baby horse) will have exceptional color or not. Extensions related to engineering management/veterinary science are also possible with the optimization of breeding and feeding. This work would provide improved accuracy of the probabilities and possibly lower feeding costs. One the scale of the sole business person this does not make sense, yet on a larger group level it could add value.

Benefits

The primary benefit of the project is to aid the prospective breeder in determining the expected after tax cash flows and their net present value for this type of operation. From this they can make the decision on whether or not they wish to start this type of business. The sensitivity analysis of the sales price presents the possible worst case and best case scenarios. Additional benefits are obtained from analysis of the optimal breeding and training plans under each level of mare (female horse) analyzed.

Analysis Technique

Net present value (NPV) was selected to evaluate the profitability of this type of business. It was selected since it provides information on maximizing wealth. For most businesses this is a primary objective.

Data

Sources

The sources of data for this project include local advertisements for both horses and stud services.[1] Additional information was obtained form personal experiences and friends in similar businesses. Tax information was obtained from the American Quarter Horse Association (AQHA) Tax Tips.[2]

Fixed Costs

The fixed costs include the basic costs to have the business at all. These costs include feed costs, veterinary fees, horseshoing costs, and the costs of entry fees to horse shows. These costs are summarized below from the first page of the spreadsheet and are the same for all cases. The complete spreadsheet is presented in the Appendix. The costs are per horse per year.

Base Conditions for all cases

Int Rate	0.05
Feed per horse per year	
Alfalfa, 1 ton	150
Grain, 50 lb/mo	96
Vitamins	45
Vet fees per horse per year	
Shots/ wormer	154
Visit allowance	50
Shoeing cost per horse per year	150
Horse shows per horse per year	200
SUBTOTAL - Costs/horse/yr	845
Compensation per mare per yr	
1 hr/wk @ $25/hr	1300

The values on the spreadsheet are basically self explanatory, with the following exceptions. The visit allowance under the veterinary fees is an allowance for emergency visits. With pregnant mares and foals some sudden visits are expected. The shoeing cost includes six visits for $25 each. The show costs include entry fees for three shows per year on average.

The compensation figure allows for a small salary to be paid to the business owner for labor related to weekly care of the horses. This figure is per mare per year and includes the costs of caring for the mare's offspring.

Assumptions

The maximum capacity of each mare is one foal per year. It will take one year for the foal to grow and be halter trained. Halter training is when the horse can be led by a person, but is too young to ride. During the second year the horse can be "broke", or trained to ride. All training is assumed to be done by a professional trainer.

In addition, no transportation costs are included. It is assumed the trainer or friends will provide transportation when it is necessary. For a larger operation of three mares or more, the costs of a truck and a horse trailer would need to be included. Both of these items can be depreciated.

Formulation

Core Case

The core case involves a ten year analysis of this business venture. Initial year zero costs include the cost of the mare to be breed and a barn to house the mare and her offspring. Both of these items are depreciated using 7 year MACRS depreciation in accordance with the Tax Code. The annual costs are listed in the spreadsheet in the Appendix and include the fixed costs mentioned in the Data section and other more specific costs. The more specific costs include the stud fees for breeding, the training costs, and the final sales price for the horse once it is broke or halter trained. These costs can vary. For this reason they are separately listed for each case.

It is assumed the business will operate as a subchapter "S" Corporation. This means that any losses from the business can be deducted from personal income. These tax savings are significant and constitute one of the top incentives for starting this type of business.

All the cases are analyzed for one mare only. It is possible to consider cases of additional mares by adding the cases together. No real economies of scale exist. Each horse needs shelter, food and care. As was mentioned in the Assumptions section no truck or trailer costs are included. For larger scale operations these costs will need to be added. Their effect will be to decrease the NPV of the cash flows while increasing the NPV of the tax savings.

Decision Trees

Decision trees were utilized prior to the solving of the economic problem to determine the optimal strategy to follow for the separate cases. The decision trees are

presented in the Appendix. Three cases are analyzed which are dependent on the initial investment in the mare. The costs are classified as follows:

High Quality Mare	$ 8,000
Medium Quality Mare	$ 5,000
Low Quality Mare	$ 2,000

For each of these alternatives a tree was developed. The purpose of the tree is to make decisions on the level of stud to breed to and the level of training to obtain prior to selling the horse. These choices are summarized below:

HighLevel Stud Fee	$ 1,000
Medium Level Stud Fee	$ 600
Training to Break	$ 900
Training for Halter	$ 300

For the various possible combinations of mares and studs different probabilities exist for obtaining the striking colors desired. Horses without these color traits are worth significantly less. The probabilities and resulting sales prices are shown in the decision trees in the Appendix. Breeding the high quality mare to the high level stud has the highest probability of success, while breeding the low quality mare to the medium level stud has the lowest probability for success.

In considering whether or not to train the horse to ride, it is important to note that breaking the horse requires an additional year of time and care. This has been accounted for in the decision trees. In all cases the highest expected value results from breeding the mare to a high level stud and training it to ride.

The calculations in the decision trees do not consider the time value of money. From the decision trees it can be seen that the interest effect is immaterial due to size of the differences between the expected cash flows of the alternatives.

The time value of money is accounted for in the economic spreadsheet analysis. The horse sales prices used in the spreadsheet are based on the expected values of the sales prices from the probabilities on the decision trees. Using the expected value for the price is a reasonable assumption because of the number of sales that will take place over the ten year period.

Spreadsheet

The complete spreadsheet is presented in the Appendix. The first page of the spreadsheet has the fixed costs and the following three pages present cashflows for the three initial choices of high, medium, or low quality mares. Each case is based on obtaining the maximum possible output form the mare of one foal per year.

The last spreadsheet is a separate case run for less than the maximum foal production of one foal per year. This case is based on meeting the minimum requirements of the Tax Code for profitability. The Tax Code specifies the business must be profitable for two out of seven years. If this requirement is not met the breeding operation is classified as a hobby instead of a business, resulting in the loss of tax deductions.

Solution / Results

The results of all of the cases are not at all impressive from a profitability standpoint. In all the cases the NPV is negative, even with a low interest rate of 5%. At first this may seem discouraging, but there is one bright spot. That bright spot is the NPV of the tax savings. This is shown in Figure 1, which compares the NPV of the cash flows and tax savings for each of the three cases.

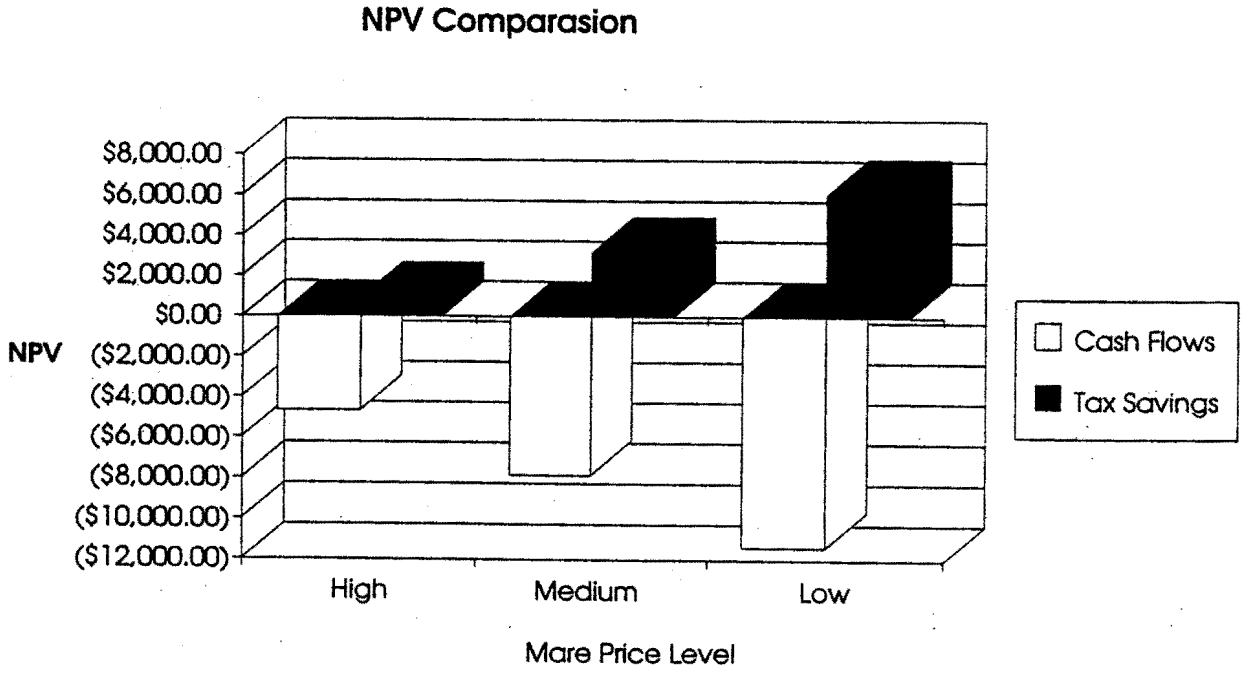

Figure 1

As can be seen from Figure 1, the lower the NPV of the cash flows, the higher the NPV of the tax savings. This is logical, since losses are required to generate the deductions.

A sensitivity analysis of the sales price was conducted to determine what would happen if the average sales price went up or down 20%. The sales price is one of the largest and most uncertain variables in the analysis. Changing it has a significant impact due to its frequency of its occurrence in the model. These results are summarized in Figure 2 for the three cases.

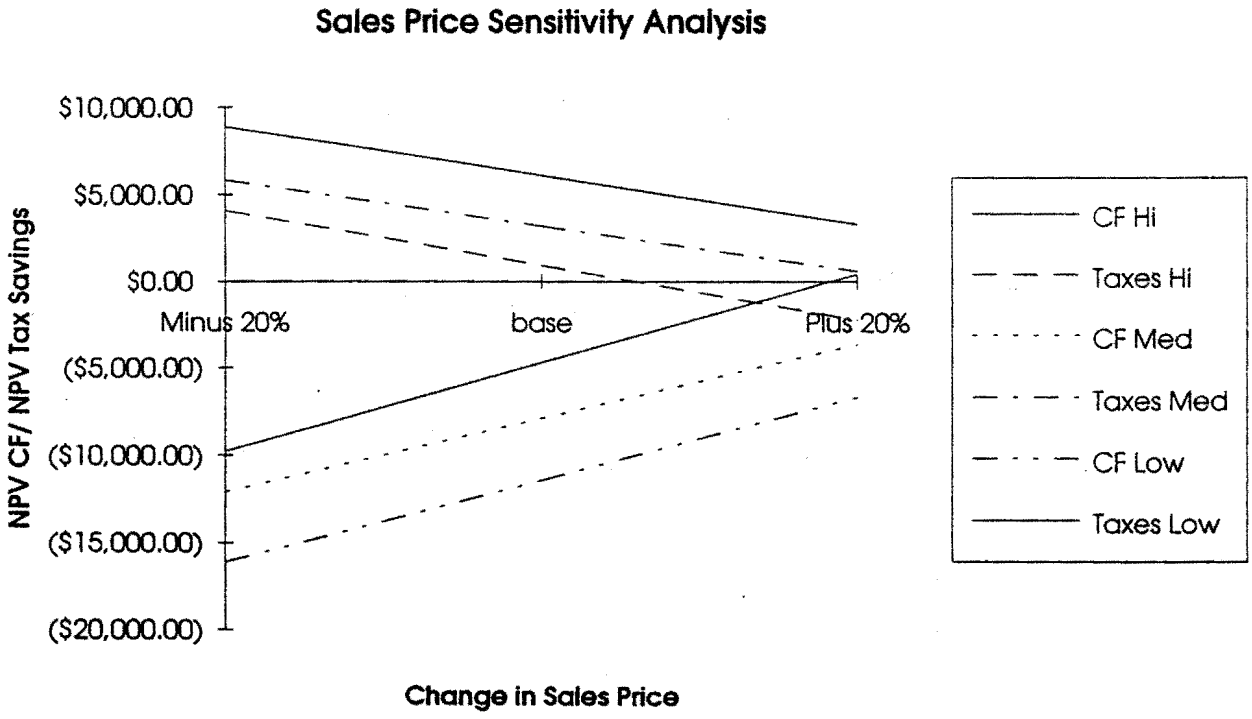

Figure 2

Unfortunately, even if the sales price was on average 20% higher, the NPV of the cash flows would be just slightly positive for the high quality mare case only. This clearly illustrates that it is highly unlikely for this business to ever be profitable. Figure 2 also shows the inverse relationship between the NPV of the cash flows and the NPV tax savings.

The final case is run with the intent of strictly obtaining tax savings. Here the objective is not to try to earn a profit. The case fits best with an individual who really likes horses, would like to breed them, and wants the government to contribute. As was previously mentioned, only two years of profit are required every seven years to qualify for the deductions. With a little work, an individual can make their hobby technically classified as a business!

In the final case only the medium grade of mare is considered. To be profitable two out of seven years two horses must be bred, trained and sold. The earlier the foals are had in the seven year period, the greater the NPV of the cash flows will be due to the compounding effect. Based on this case the NPV of the tax savings is just over $ 6,000 and the NPV of the cash flows is $ -12,500. To most invididuals the tax savings is a significant amount of money, and probably worth the trouble of setting up the subchapter S corporation and filing out the necessary tax forms.

Many variations of the tax savings case are possible. The specifics will vary depending on the individual's interests and the timing of the actual breeding. The common point to all these cases is that significant tax savings are possible.

Conclusion

The only case in which it makes sense to proceed with this type of project is in the final case, the case with the goal of tax savings on the individual's terms. This case provides significant flexibility to the individual, because all that is required is two out of seven years profit. That requirement is fairly easy to meet. Until the tax code changes this option makes good sense for a horse enthusiast to pursue.

For this project further analysis would add little value. The numbers do not support this as a business venture. All in all, it is a hobby with some pretty good tax benefits.

References

1. "Horses: Buy, Sell, Advertise", February, 1993, Horse Publications Inc., Redmond, Wa.

2. "Tax Tips for Horse Owners", 1990 Edition, American Quarter Horse Association, Amarillo, Tx.