Identifying Risk Attitudes
Managing the Modern Farm Business
Module 1
RISK
MANAGEMENT

Identifying Risk Attitudes

Module 1

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Canada

and

University of Alberta
Introduction

The cover on this publication shows the Chinese symbol for ‘crises’. The symbol is made up of two parts; one meaning “danger” and the other meaning “opportunity”.

The characteristics of risk are very similar – there is a potential for profit but also potential for loss.

Managing an agriculture business in the 1990s and beyond will require a greater ability to analyze and evaluate risk. As farming becomes more capital intensive, margins narrow, markets change and the adoption of rapidly changing technology is required, risk management will be key to success.

The following four modules – “Identifying Risk Attitudes”, “Identifying Risk Sources”, “Measuring Degrees of Risk” and “Designing Risk Management Strategies”, will assist farmers in assessing their own risk profile and their subsequent ability to meet expectations.

Terry Peterson
Director, Farm Management Branch
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FOREWORD

Farm business management is the art and science of making decisions about the use of available resources and acting on those decisions in an uncertain world so that the short- and long-term goals of the business owners are as fully satisfied as possible.

This definition is not new, but rather a distillation of the thoughts and philosophies of many writers on the topic. The definition contains several key words. Management is concerned with achieving goals. Decision making and action are crucial. Resources are limited and the world is uncertain.

As the general manager of your business, you need to plan, organize, control, co-ordinate, and motivate your management team. You must see to it that the details of production, marketing, financing, and personnel management are carried out.

As production manager, you must decide what to produce, how to produce it, and how much of it to produce, and you must set the production process in motion. As marketing manager, you must form expectations of product prices, and you need to carry out the functions of buying inputs and selling the products. As financial manager, you need to decide which assets to acquire, how to raise the funds to acquire them, and also when to exercise financial control. As personnel manager, you need to find and keep the right staff and then make sure they are properly trained to do the job.

Managing the Modern Farm Business is a series of modules designed to help in developing the necessary concepts and skills essential to effectively manage the production, marketing, financing, and human resource aspects of the farm business in the 1990s. If you are the owner-manager of a farm, these modules will improve your chances of operating a successful business. If you are a farm management advisor, or an instructor, these modules are useful in reviewing and enhancing your understanding of management principles. They also provide an excellent resource of study materials, examples, and exercises for your students and clients.

Management is a process of gathering information, making decisions, and taking action. This module will help you take part in this process.

Leonard Bauer, P.Ag.
Technical Editor
ACKNOWLEDGEMENTS

The authors acknowledge the visible and invisible contributions of many groups and individuals.

The ideas portrayed in these modules were first developed as a tool for teaching introductory farm management. Many students at the University of Alberta have provided a worthwhile testing ground for the subject matter presentation. Their candid contributions have been invaluable.

Over 100 staff members of the B.C. Ministry of Agriculture, Fisheries and Food have participated at risk management workshops and have provided useful suggestions for improvement. Their contributions and those of Howard Joynt and Mike Cowley of the B.C. Ministry have provided practical insights invaluable to this set of modules.

Appreciation is extended to Agriculture Canada for the financial support and encouragement provided in developing this module.
INTRODUCTION

Risk Management Modules

Discussing farm risk usually involves reference to poor yields, disastrous events, calamitous markets and missed opportunities. There is no doubt that bad things happen on the farm. Good things can happen as well: high yields, bountiful markets, and avoided disasters are some examples. But even these good things can have a bad side for the operator who did not anticipate or plan for the event.

A high price for barley coinciding with a bumper crop is a good thing for the grain farmer who planted barley. It would be a bad thing for the farmer who decided against planting barley. Similarly, a farmer who sprayed for insects would be protected in the case of an infestation; in a year of few insects, he will have spent money unnecessarily. Risk, then, has two major components: the probability of bad things happening, and the consequences of bad things that have happened.

Farm managers need to understand their attitude toward risk. They must develop methods to identify, measure, and control risk to reduce the losses that are the consequence of bad things happening. Effective management can help to ensure that good things happen, losses are avoided, and opportunities captured. These are the themes that are developed in each of the modules.

The first module, Identifying Risk Attitudes, examines the predisposition to risk of the manager. One must be able to recognize and allow for one’s own risk attitude in selecting the “right” course of action. Identifying Risk Sources explores the compounding effect that financial risk has on business risk. Measuring Degrees of Risk presents methods that the manager can use to calculate risk exposure and make effective comparisons of alternate actions. Designing Risk Management Strategies outlines the ways that effective farm managers can reduce overall risk exposure.
Identifying Risk Attitudes

The manager’s own risk attitude will determine the courses of action followed. Those who are overly cautious by nature may avoid risky situations and fail to capture opportunities.

Those who are extreme risk seekers are blind to the danger presented by particular courses of action.

In this module, you will learn how to:

- identify risk averse managers
- identify risk-seeking managers
- complete a decision chart
- compare the decisions of risk-seeking and risk averse managers.

A number of situations are used to demonstrate how the attitude of the manager affects the course of action taken. It is only by knowing one’s predisposition that prejudgements and predispositions can be accounted for in critical decision making.
At the end of this module, you will test your knowledge and skill by completing a payoff decision chart for the following situation.

Farmer White and Farmer Brown are neighbours in the community of Vishnia. Usually they have clear dry weather in the autumn and an excellent harvest season. Sometimes they have cold, wet weather and a short harvest season. They agree that there is a high likelihood of an excellent harvest season and a low likelihood of a poor one.

There are two harvesting systems available to them. One system has enough capacity to harvest the crop under the excellent situation. The second system is more costly but is large enough to complete the harvest even under the worst conditions. The two neighbours agree on the facts; nevertheless, Mr. Brown has decided to purchase the normal capacity system while Mr. White has chosen the high capacity system.

Place the correct information in the decision chart and answer the question.

<table>
<thead>
<tr>
<th>Probability</th>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>High/Low</td>
<td>Normal harvest season</td>
<td>Mr. Brown Normal capacity harvest system</td>
</tr>
<tr>
<td></td>
<td>Crop harvested at (extra/no extra) cost</td>
<td>Mr. White High capacity harvest system</td>
</tr>
<tr>
<td>High/Low</td>
<td>Short harvest season</td>
<td>Crop harvested with (partial/no) loss</td>
</tr>
</tbody>
</table>

Which of the two farmers is more averse to risk?

If you can complete the chart and answer the question now without further information or assistance, you may wish to examine the readings and exercises in this module for review purposes.
THE MANAGEMENT PROCESS

The first step in farm management is setting goals and objectives. Performance is measured against goals to detect problems and to identify opportunities. Then the possible ways of solving the problem or realizing the opportunity are specified. Next a particular solution is chosen and implemented. These steps of problem definition, solution, and action are carried out by the farmer and farm family as manager(s) of the business.

Risk exists because the future is unknown. Because there is uncertainty about the future, there is a chance of loss. Risk relates to the size of the potential loss (the severity of it) and to the likelihood that it will occur (the frequency of it).

Loss can happen in two ways. There can be a direct loss, as in the case of a house burning down, or a business being burglarized, or an investment that turns sour. A second type of loss is a lost opportunity. For example, a decision to not invest in an activity that turns out to be profitable is a lost opportunity.

The Importance of Information

When the decision-maker has a number of ways of resolving the situation, information becomes important. Sometimes the identification of the problem provides the manager with enough information so that the choice can be made with confidence. At other times, more information is needed before decisions can be made.

Collecting data and sorting them into useful information costs money and takes time. Time in assembling information means a delay which may jeopardize the decision. Making a decision impulsively, on too little information, increases the chance of error. But gathering too much information might not improve accuracy enough to justify the extra cost. By taking too long to make a decision, choices may be limited and a decision forced.

A decision is made in the present but will have its results in the future. The result of the decision depends upon action taken. Action is something within the control of the decision-maker. The result of the decision also depends upon events. Events might happen without the decision-maker’s control. At the time of the decision, the decision-maker does not know which of the possible events will occur. Because of this uncertainty, there is a risk that the decision will be wrong.
Determining Risk Attitude

Because all decisions have an element of uncertainty about them, all decision-makers are risk takers. The degree to which decision-makers enjoy taking risk depends upon individual circumstances. To illustrate the concept, consider this example.

It is autumn, the fall roundup is complete and 100 head of good quality beef calves have been weaned. Should the calves be sold, or should they be put into the feedlot for finishing?

Decision-Making Elements

This problem contains three elements: the possible actions, the possible events, and the result or payoff of each action for each event. We will show these on a decision chart.

<table>
<thead>
<tr>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>sell now</td>
</tr>
</tbody>
</table>

There are two possible actions:

1. Sell the calves now
2. Finish the weaned calves and sell them later

These actions are added to the decision chart.

There are also two events beyond the decision-maker’s control which affect the outcome or payoff:

1. A strong price for finished cattle (6 months from now) ($4.25)
2. A weak price for finished cattle (6 months from now) ($2.75)
These events can be placed on the decision chart

<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>(price in 6 months)</td>
<td>sell now</td>
</tr>
<tr>
<td></td>
<td>sell later</td>
</tr>
<tr>
<td>Strong price in six</td>
<td></td>
</tr>
<tr>
<td>months</td>
<td></td>
</tr>
<tr>
<td>Weak price in six</td>
<td></td>
</tr>
<tr>
<td>months</td>
<td></td>
</tr>
</tbody>
</table>

The result or payoff of the situation depends upon the interplay of actions and events. There are four possibilities:

1. If the rancher decides to finish the calves and the finished cattle price in six months is strong, a profit is made.
2. If the calves are kept and the finished cattle price in six months is weak, a loss occurs.
3. If the weaned calves are sold now and the finished cattle price in six months is strong, the opportunity of making a profit is lost.
4. If the weaned calves are sold now and the finished cattle price in six months is weak, a loss is avoided.

The results or payoffs are added to the decision chart.
<table>
<thead>
<tr>
<th>Event (price in 6 months)</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rancher A</td>
<td>Rancher B</td>
</tr>
<tr>
<td>sell now</td>
<td>sell later</td>
</tr>
</tbody>
</table>

| Strong price in six months | | |
| Weak price in six months | | |

In this decision chart, there are two ranchers who face the situation. We will call them Rancher A and Rancher B to give them anonymity.

Rancher A has chosen to sell the weaned calves. He is extremely risk averse. The prospect of loss, no matter how small the chance of that loss, is extremely unsettling. Rancher A chose to sell the calves in the fall because this gives the best result if the worst event (a weak price) results. Rancher A’s action in the face of any risk is to avoid it.

Rancher B chose to keep the weaned calves and finish them. He enjoys the excitement of risky activities. No matter how small the chance, the possibility of a profit opportunity was worthwhile. He chose to place his calves into the feedlot because this would give the best result in the case of a strong price. Rancher B is a risk seeker; his action is to accept any level of risk that is encountered.

Rancher A and Rancher B are extreme examples of managers’ attitudes towards this risk. Most decision-makers are found between these extreme positions. They will require more information before choosing and acting to either accept or avoid risk.
### Rancher’s Decision Chart – Exercise

<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rancher A</td>
<td>Rancher B</td>
</tr>
<tr>
<td>Avoid (sell now)</td>
<td>Accept (sell later)</td>
</tr>
<tr>
<td>Strong price in six months</td>
<td>Lost opportunity correct/incorrect</td>
</tr>
<tr>
<td></td>
<td>Profit correct/incorrect</td>
</tr>
<tr>
<td>Weak price in six months</td>
<td>Loss avoided correct/incorrect</td>
</tr>
<tr>
<td></td>
<td>Loss correct/incorrect</td>
</tr>
</tbody>
</table>

If the finished price for beef in 6 months is strong, Rancher B’s decision to keep the calves and feed them is *(correct/incorrect)*. The decision will result in a *(profit/loss)*. Rancher A’s decision to sell the calves is *(correct/incorrect)* if the price is strong. The decision will result in a *(lost opportunity/loss avoided)*.

If the finished price for beef is weak, Rancher B’s decision to keep the calves is *(correct/incorrect)*. His decision will result in a *(profit/loss/lost opportunity/avoided loss)*. Rancher A’s decision to sell the calves is *(correct/incorrect)* if the price is weak. The decision will result in *(profit/loss/lost opportunity/avoided loss)*.

### Rancher’s Decision Chart – Answer

If the finished price for beef in 6 months is strong, Rancher B’s decision to keep the calves and feed them is **correct**. The decision will result in a **profit**. Rancher A’s decision to sell the calves is **incorrect** if the price is strong. The decision will result in a **lost opportunity**.

If the finished price for beef is weak, Rancher B’s decision to keep the calves is **incorrect**. His decision will result in a **loss**. Rancher A’s decision to sell the calves is **correct** if the price is weak. The decision will result in **avoided loss**.
The decision chart that we have constructed has three elements. These are:

- actions: possible things the decision-maker (manager) can do
- events: those things which may occur but are beyond the control of the manager
- payoffs: the results or outcomes of an action should a particular event occur.

**Levels of Risk Aversion**

The next level to consider is the likelihood of an event occurring. There are numerous methods by which this question can be assessed and the relative probability determined. The Cattle Feeder Decision situation will help to illustrate this point.

In the same situation faced by Rancher A and Rancher B (100 weaned calves to be sold or placed in a feedlot), a market forecast predicts a high likelihood of a strong price for finished beef in 6 months.

**Likelihood of an Event**

- The likelihood of the good thing happening (a strong price for beef) is high.
- The likelihood of a bad thing happening (a weak price for finished beef in 6 months) is therefore low.

The market forecast provides information about the likelihood of the events. This information of the probability of the event occurring can now be added to the decision chart.

Because of their extreme risk attitudes, Rancher A and Rancher B chose to ignore the forecast information. They made their choices no matter what the probability of the events. The forecast information has no effect on their decisions. Another pair of ranchers we call Rancher C and Rancher D have less extreme risk attitudes.

Rancher C is somewhat averse to risk. For this reason, he chose to sell the weaned calves. He is avoiding the risk. Rancher D is less averse to risk than Rancher C. With the forecast of a strong price for finished beef in 6 months, Rancher D would choose to accept the risk and feed the calves. The chance of profit from the action (feeding the weaned calves to finished beef) makes up for the risk that is involved. The extra profit possibility was not sufficient to overcome Rancher C’s aversion to risk. Rancher D is accepting the risk presented.
### Probability | Event | Action
--- | --- | ---
High | Strong prices in six months | Rancher C: Avoid (sell now)
Low | Weak prices in six months | Rancher D: Accept (sell later)

Next year, the market forecast might be different. If, for example, the market forecast is for an even higher likelihood of strong prices for finished beef, this also means that there is therefore an even lower likelihood of a weak price. Rancher C might choose to feed the cattle.
### Identifying Risk Attitudes

#### Managing in Uncertainty

<table>
<thead>
<tr>
<th>Probability</th>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>higher</strong></td>
<td>Strong prices in six months</td>
<td>Rancher A: Avoid risk (sell now)</td>
</tr>
<tr>
<td><strong>lower</strong></td>
<td>Weak prices in six months</td>
<td>Rancher B, C, &amp; D: Accept risk (sell later)</td>
</tr>
</tbody>
</table>

- **Rancher A** will ignore the information and sell the weaned calves.
- **Rancher B** will ignore the information and finish the weaned calves.

The improved chance of profit in the market forecast information causes **Rancher C** to feed the calves rather than sell them now.

- **Rancher D** will assess the information and finish the calves.

Most people are like **Rancher C** or **Rancher D**. They are willing to accept risk in relation to the level of anticipated profit.
CONCLUSION

A new element has been added to the decision chart: the likelihood (or probability) of an event occurring.

The decision chart, then, has these four elements:

- actions: possible things the decision-maker (manager) can do
- events: those things which may occur but are beyond the control of the manager
- payoffs: the result or outcome of an action should a particular event occur
- likelihood or probability of the event occurring.

Possible Errors

The manager must decide upon an action in the face of the events. A decision can be wrong in one of two ways.

1. Error occurs if the decision-maker decides to take an action and an unfavourable event happens.
2. Error occurs if the decision-maker decides to not take an action and a favourable event happens. In this case, an opportunity is lost.

Risk management attempts to minimize those errors.

The risk averse decision-maker places greater emphasis upon the consequences of an unfavourable event.

The risk-seeking decision-maker places greater emphasis on the possibilities of a lost opportunity.

Controlling Risk

So far, we have seen that risk can be accepted or avoided. There are other actions possible to manage risk. The following examples explore some of these opportunities.

An orchard owner must decide whether or not to spray against an insect infestation. The chances of an outbreak are low.

There are two possible actions in this situation: the orchard owner can choose to control the risk of infestation by spraying the orchard, or accept the risk of infestation by not spraying.
There are two possible events: an infestation of insects, or no infestation of insects.

Four results or outcomes are possible.

If the orchard owner chooses to spray and there is an outbreak in the region, damage to the crops and financial loss are avoided. If there is no insect outbreak and he has chosen to spray, he will not suffer the crop damage. He will, however, have borne the cost of spraying. Overall profit will be reduced by that amount. If he chooses not to spray and there is an outbreak, he will sustain crop damage. There is the probability of significant financial loss. If the owner chooses not to spray and the infestation does not materialize, he will not incur the cost of spraying or reduced profits.

Complete the decision chart and circle the appropriate responses.

*The Orchard Owner’s Decision Chart – Exercise*

<table>
<thead>
<tr>
<th>Probability</th>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Outbreak of insects</td>
<td>Spray/Loss avoided correct/incorrect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Spray/Loss incurred correct/incorrect</td>
</tr>
<tr>
<td>High</td>
<td>No outbreak</td>
<td>Spray/Extra cost correct/incorrect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not Spray/Cost saving correct/incorrect</td>
</tr>
</tbody>
</table>

If the orchard owner’s risk attitude was like that of Rancher C (somewhat averse to risk), he would *spray/not spray*.

If his risk attitude was more like Rancher D (less averse to risk), he would *spray/not spray*.
### The Orchard Owner’s Decision Chart – Answer and Analysis

<table>
<thead>
<tr>
<th>Probability</th>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Outbreak of insects</td>
<td>Loss avoided correct</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loss incurred incorrect</td>
</tr>
<tr>
<td>High</td>
<td>No outbreak</td>
<td>Extra cost correct</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cost saving correct</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spray</th>
<th>Not Spray</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If the orchard owner’s risk attitude was somewhat averse to risk (like Rancher C), he would **spray**. If his risk attitude was less averse to risk (like Rancher D), he would **not spray**.

A person who tends to be risk averse, like Rancher C, would choose to spray. The decision is to control the risk. If the owner’s attitude to risk is more like Rancher D, however, he might accept the risk and not spray. The probability of an infestation not happening is high, and the less risk averse individual would be willing to accept the risk rather than reducing profit by incurring the cost of spraying.

So far, we have learned that one can accept risk, avoid risk, and now, we can see that it is possible to control risk. The particular choices made depend on risk attitude. There is another risk control method that can be employed.
**Transferring Risk**

Transferring risk is another way of managing risk. This concept is demonstrated in the example below.

**The Crop Insurance Decision**

A grain farmer must decide whether to insure the crop against hail. With a high probability of hail, the farmer could transfer the risk of hail to the insurance company by purchasing hail insurance. If there is no hail, then revenue is reduced by the amount of the insurance premium. If the farmer chose to accept the risk, the hail insurance would not be purchased. If there is hail, crop revenue is lost. With no hail, the farmer who accepts the risk would save the cost of the insurance premium.

Complete the decision chart and circle the appropriate responses.

**The Hail Insurance Decision Chart – Exercise**

<table>
<thead>
<tr>
<th>Probability</th>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Hail</td>
<td>Insure</td>
</tr>
<tr>
<td>Low</td>
<td>No hail</td>
<td>Lose crop revenue</td>
</tr>
</tbody>
</table>

Receive insurance payout correct/incorrect

Profit reduced by the cost of insurance correct/incorrect

Profit not reduced by the cost of insurance correct/incorrect
The grain farmer who is risk averse (like Rancher C) would **transfer** the risk and **purchase** the insurance. A less risk averse grain farmer (like Rancher D) would **accept** the risk and **not purchase** hail insurance.

**The Hail Insurance Decision Chart – Answer and Analysis**

<table>
<thead>
<tr>
<th>Probability</th>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Hail</td>
<td>Insure</td>
</tr>
<tr>
<td>Low</td>
<td>No hail</td>
<td>Don’t insure</td>
</tr>
</tbody>
</table>

Receive insurance payout **correct**

Lose crop revenue **incorrect**

Revenue reduced by the cost of insurance **incorrect**

Profit not reduced by the cost of insurance **correct**

The grain farmer who was risk averse (like Rancher C) would **transfer** the risk and **purchase** the insurance. A less risk averse grain farmer (like Rancher D) would **accept** the risk and **not purchase** hail insurance.

There are at least four important strategies in risk management. It is possible to **avoid** risk, **control** risk, **accept** risk, or **transfer** risk.

The key to managing a successful operation is knowing when to avoid, control, accept or transfer the risk. The decision involves examining alternative actions.
Whether to accept, transfer, control, or avoid risk is affected by one’s attitude. Our four ranchers cover the range of risk attitudes. Those at the extremes accept or avoid all risk. Those like Rancher A are extremely risk averse. They choose to avoid as much risk as possible. The other extreme is represented by Rancher B, who prefers risky situations.

Managers make better decisions when they recognize their own attitudes towards risk and take them into account when choosing actions. These attitudes, expressed as business goals, involve increasing returns and reducing risk.

Comparing Risk and Return

Managers need a method with which to compare risk and return for alternate courses of action. More than the identification of the payoff shown on the decision chart, they need to be able to compare the profitability of improvements in productivity and the protection of investment. These principles can be illustrated by examining investments in the stock market. Once the methods are understood, they can be applied to a farming situation.

The Risk Return Graph

The choices that investors make in the stock market reflect their risk attitudes, just like the farm managers’ selections were based on their risk attitudes. Because the risk involved can be directly measured by the return obtained by the investment, a chart showing rate of return compared to level of risk can be constructed.

Because it is a measure of the amount of return for each level of risk, it can be called a risk efficiency chart.

The level of risk involved in an investment is shown on the horizontal axis. As an investment increases in risk, it would be placed further to the right.

Return on investment is shown on the vertical axis. The risk and return, then, for a given investment can be located and read on the graph.
In this section, seven companies are compared to illustrate the relationship of risk attitude.

Company 1

Company 1 is a manufacturing company that has moderate expected return with low risk. It is a “blue chip” investment. The level of risk is shown on the horizontal axis and the level of return on the vertical.

As a secure investment, Company 1 has relatively low risk of loss to the investor. This is shown on the chart by its location close to zero on the “risk” axis. The moderate return to the investor in either direct dividends and indirectly through increased sale value is shown by its location on the vertical axis.

Company 2

Company 2 is also a manufacturing company in a similar business as Company 1. It is larger and has been established for many years. Company 2 has an excellent reputation and represents the same level of risk as Company 1. At the present time, however, the rate of return on investment is approximately one-half that of Company 1.

Because Company 2 has the same risk for the investor as does Company 1, it is located on the same horizontal placement. With a rate of return at half that of Company 1, however, its location is lower than that of Company 1.

Because the level of risk for the two investments is the same, investors would tend to choose Company 1 over Company 2 because of the higher return. All investors, when given a choice between two stocks of equal risk, would be expected to choose the one with the higher rate of return.

Company 3

Company 3 is also a manufacturing firm in the same business as 1 and 2. The rate of return on investment is the same as that for Company 1 and approximately double that of Company 2. However, Company 3 is a much larger operation than either Company 1 or Company 2. It has expanded rapidly recently and is therefore more of a “risky” investment than the others.
Company 3, then, is located at the same level of return as Company 1 on the risk efficiency chart. Thus, for the same investment as in Company 1, the investor in Company 3 has a greater chance of loss.

Because the rate of return for Company 3 is the same as for Company 1, no reasonable investor would purchase stock in the company. Without any change in the level of return for amount of risk, Company 3 would be unable to attract investment.

**Company 4**

A fourth investment possibility, Company 4, represents a different business, rate of return, and level of risk. Company 4 is a “high tech” operation in a new and developing area of the traditional business of the others. Because the business is established but the approach to the operation is new, there is slightly more risk of loss to the investor than in the case of Company 1 or 2. In fact, the risk is assessed to be the same as for Company 3.

The opportunity for return on the investment is greatly enhanced by the “high tech” operation. Thus, Company 4 is located above Company 3 on the Risk Efficiency Chart. This represents a higher return than Companies 1, 2, and 3 at the same risk as Company 3.

There are, therefore, two reasonable investment opportunities that are available for selection by potential investors. The choice between Company 4 and Company 1 could be left to the person risk attitude of the investor.
Use the table to do the exercise.

<table>
<thead>
<tr>
<th>Risk seeking</th>
<th>Rancher B</th>
<th>Company 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less risk averse</td>
<td>Rancher D</td>
<td>Company 5</td>
</tr>
<tr>
<td>More risk averse</td>
<td>Rancher C</td>
<td>Company 4</td>
</tr>
<tr>
<td>Risk averse</td>
<td>Rancher A</td>
<td>Company 1</td>
</tr>
</tbody>
</table>

**Exercise**

An extremely risk averse individual like Rancher (A, B, C, D) would prefer to stay with Company 1. Ranchers (A, B, C, D) however, would find the extra return in Company 4 a sufficient premium to compensate for the extra risk involved. They would invest in Company 4 rather than in Company 1.

**Answer**

An extremely risk averse individual like Rancher A would prefer to stay with Company 1. Ranchers C and D however, would find the extra return in Company 4 a sufficient premium to compensate for the extra risk involved. They would invest in Company 4 rather than in Company 1.

**Company 5**

A fifth investment opportunity with considerably more risk than Company 4 but only slightly more return is shown in the risk return graph. A less averse investor, like Rancher D, with sufficient information, might find the small increase in return enough to compensate for the extra risk. But a more risk averse investor, like Rancher C, could remain with Company 4.

A risk-seeking investor, like our Rancher B, of course, would unquestioningly place his future in the riskiest opportunity presented.
Determining Risk Efficiency

The risk return chart was developed to compare the five different investment opportunities. In reality there is a large list of investment opportunities. If all the possibilities were placed on the chart, we would have a smooth line on a graph.

The curve represents risk-efficient investments, that is, those opportunities that represent a reasonable rate of return for the level of risk presented. The only criterion for the selection of one investment over another is the risk attitude of the investor.

Opportunities far from the curved line (like Company 3) are not attractive. The expected rate of return for anticipated risk places them far from the risk-efficient curve. In other words, there is no rate of return to match the level of risk. The world is not static, however, and many changes can occur.

Increasing Return

If the share price for Company 3 dropped, the expected rate of return would increase to be located between that of Company 4 and Company 5.

The price per share would drop because the amount that investors are willing to pay for the stock in Company 3 is lower. The revenue from the company would be unchanged. Thus, the return (or profit) on the investment is increased to place Company 3 on the risk-efficiency curve at position 4.

The same result would occur if the profitability of the company were increased through enhanced production at the same cost and without changing the level of risk. Company 3 would approach the risk-efficiency curve. It would become a viable option for investors depending upon risk attitude to guide selection.
Reducing Risk

If the management of Company 3 is able to find ways to reduce risk without changing the overall earning position, the position of Company 3 would move over to the efficiency curve. Without an increase in return, then, it would be at the location marked 1.

Risk Efficiency on Your Farm

Most actions result in a combination of increased profit and reduced risk. Such actions move the business closer to the risk-efficiency curve.

If your farm is located at position 3 on the Risk Efficiency Chart, the options available to the management of Company 3 are the same as those for your farm. That is, it may be possible to increase revenue at the same risk and cost (4). Or, it may be possible to reduce risk at the same cost and level of return (1). You may be able to combine a reduction in exposure to risk with a reduction in overall costs and therefore an increase in return (3A). It may be possible to accept additional risk if there is a large enough increase in profit. Such an action would move the business to position 5.

Your goal is to improve productivity, reduce debt load, and improve return on investment to get yourself on to the risk-efficiency line. The ways that you choose to do these depend on your attitude to risk. Are you happiest at 3A? 3B? 3C? The choice is yours.
Dealing with risk is an integral part of the manager’s job. Change brings about uncertainty. Uncertainty causes exposure to the risk of making errors. But all uncertainty is not bad because change is not necessarily bad. Uncertainty is a fundamental part of life and managers must manage risk so that the consequences of bad things happening are reduced. The manager is continually involved in making choices from among alternative courses of action. High payoffs usually have a higher risk associated with them. In making choices, managers must take into account the goals and objectives of the business. These goals involve a trade-off between risk and return.

The goal that you choose can be located anywhere along the line of the efficient balance between amount of risk and expected return. The next module in this topic, Identifying Risk Sources, will help you to establish the difference between business and financial risks. Measuring Degrees of Risk will introduce you to the mathematical dimensions of managing risk in your operation. Finally, the module entitled Designing Risk Management Strategies will show you ways to control your exposure to risk.

The particular strategy you select, however, will be in large measure dependent on your own attitude to risk. Before proceeding with further study in the science of risk management, you should test your knowledge of risk by completing the Self-Check that follows.
Farmer White and Farmer Brown are neighbours in the community of Vishnia. Usually they have clear, dry weather in the autumn and an excellent harvest season. Sometimes they have cold, wet weather and a short harvest season. They agree that there is a high likelihood of an excellent harvest season and a low likelihood of a poor one.

There are two harvesting systems available to them. One system has enough capacity to harvest the crop under the excellent situation. The second system is more costly but is large enough to complete the harvest even under the worst conditions. The two neighbours agree on the facts, nevertheless Mr. Brown has decided to purchase the first system while Mr. White has chosen the second.

Place the correct information in the decision chart and answer the question.

<table>
<thead>
<tr>
<th>Probability</th>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>High/Low</td>
<td>Excellent harvest season</td>
<td>Correct/incorrect Crop harvested at (extra/no extra) cost</td>
</tr>
<tr>
<td></td>
<td>Poor harvest season</td>
<td>Correct/incorrect Crop harvested with (partial/no) loss</td>
</tr>
</tbody>
</table>

Which of the two farmers is more averse to risk?
### ANSWERS TO SELF-CHECK

<table>
<thead>
<tr>
<th>Probability</th>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td>Clear, dry weather and normal harvest season</td>
<td><strong>Correct</strong> choice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crop harvested at no extra cost</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>Cold, wet weather and short harvest season</td>
<td><strong>Incorrect</strong> choice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crop harvested with partial loss</td>
</tr>
</tbody>
</table>

Mr. Brown, Mr. White
- **Mr. Brown**: Normal capacity harvest system
- **Mr. White**: High capacity harvest system

**Incorrect** choice
- Crop harvested but at extra cost

**Correct** choice
- Crop harvested with no loss

Mr. White, the farmer with the bigger system, is more averse to risk.