

THE GINSENG GAME

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ABSTRACT

The Ginseng Game is designed to teach the principles generally associated with the tragedy of the commons and specifically with competition in industries susceptible to resource depletion. The game explicitly uses competitive forces to encourage groups to escalate commitment to short term profits while visually conveying resource depletion. Student teams must use the available information, “out of the box” critical thinking, problem solving, coordination, and cooperation to achieve the objective of long term industry sustainability. The game and debriefing can be run in a single class session. It can be delivered with or without computer presentation (game computations must be performed with the game’s MS Excel spreadsheet). The instructor calculates industry harvest and team performance data with an excel spreadsheet and may display that information with or without the aid of a presentation system.

INTRODUCTION

The phenomena of short term thinking and profit taking is a problem that plagues many industries to the detriment of customers, businesses and society. There are many examples. The tendency to mismanage natural resources preceded failures in the timber and fishing industries. The management of animal populations and the environment are two areas where small short term benefits drive behavior that ignores large long term costs. In the last decade, failures in corporate governance, fraudulent accounting, and most recently the failure to think about society’s long-term well being in financial markets highlight the need to teach business students the perils of putting short term profits ahead of industry sustainability.

THE TRAGEDY OF THE COMMONS (Hardin, 1968)

The tragedy of the commons exists when individuals derive personal benefit from collectively owned resources that are subject to depletability and those individuals act to secure that benefit at the expense of the common good. The lack of explicit private ownership sets up conditions where each individual has an incentive to consume as much of the resources as possible in order to maximize their individual situation, even if at the expense of the collective good. (Coase, 1937, 1960) Without some form of restraint, oversight, or collective governance, this results in a race to consume the resources and eventual resource

depletion. In the absence of restraint, oversight or collective governance, people and societies do a poor job balancing short-term consumption with the needs of the collective good. People and societies tend to over emphasize short term benefits and ignore long term costs.

THE PROBLEM OF SHORT TERM THINKING

People and organizations do a poor job balancing short-term and long-term needs and desires. We tend to over emphasize short term gains at the expense of long term needs. Over harvesting is a historic problem that has caused problems in both the fishing and timber industries. The short term gains produced by over fishing or clear cut timber harvesting emphasize the incentives inherent in the tragedy of the commons. Many other problems of short term thinking can be explained using the concept of the tragedy of the commons.

Historically, human societies have caused (Diamond, 1997) and continue to cause the extinctions of many animal species. The extinction of such species as the Flores Cave Rat, the Desert Rat-kangaroo, the Dodo Bird, the Labrador Duck, the Passenger Pigeon, and many others (IUCN, 2008) speak to the human propensity to put short interests ahead of long term considerations. If there are economic benefits to be gained, individuals and businesses may act in ways to gain those benefits even if environmental damage occurs. The benefits are generally private, short-term, and significant, while the costs accrue to society and are long-term and smaller in effect to those who gained the benefit. Additional examples occur in business.

The desirability of strip mining is strongly offset by the ecological damage borne by the rest of society yet mining companies would still engage in the practice if it wasn’t for strong governmental regulation. The fact that strip mining occurred at all is because the economic gains to mining companies were significant and the social costs of ecological damage were borne by the local community after the mining companies left the scene.

In the last two decades, the phenomena of short term profit taking is reflected in the collapse of the mortgage and banking industries. (Steverman & Bogoslaw, 2008) This failure occurred because speculators wrote and sold mortgage contracts that were lucrative to them but risky to mortgagees. Successful speculators exited the industry long before the financial collapse by selling the mortgages to established mortgage brokers who later suffered when mortgagees could no longer make payments.

Each of these problems reflects the problem of short-term thinking and the lack of attention to sustainability. This game is

intended to teach students about competition in industries susceptible to a fixation on short term thinking and characterized by the potential for resource depletion.

OVERVIEW OF GAME

This game is based on Fish Banks Ltd, 1990, by Dennis Meadows (Meadows, 1990). The author's experience with Fish Banks is that every student group exterminates the fish population and destroys the long term profitability of the industry. The Ginseng Game is intended to provide a similar industry situation but with a greater likelihood that the students will recognize the problems associated with resource depleteability and take corrective action before long term profitability is destroyed. This is the first iteration of this game and the game has **not** yet been tested in the classroom.

STUDENT LEARNING OBJECTIVES

1. Students will learn to identify the characteristics of industries susceptible to resource depletion and be able to list susceptible industries.
2. Students will learn to identify market and industry incentives that encourage short term thinking and a fixation on short term profit taking.
3. Students will experience the competitive pressures of short term profit taking in an industry susceptible to resource depletion and either, a) learn to act proactively or reactively to prevent industry demise, or b) experience the failure so they can learn from their mistake.

BASIC DATA

Instructional objective: To teach problem solving skills associated with competition in industries with depletable resources

Game objectives: To teach students to engage in strategic conduct that ensures industry sustainability and long term profitability, and to understand the problems associated with a fixation on short term thinking and profitability.

Target audience: Graduate and undergraduate students.

Playing time: 90 minutes.

Debriefing time: 30 Minutes.

Number of players: 4-6 teams of 2-5 people per team.

Materials required: Players handbook (Appendix 2), Game software, Plastic graduated container with beads representing stock of wild ginseng, company worksheets (included at end of Players Handbook), pencils or pens, each team will need a calculator.

Equipment/room setup required: The instructor will require the use of a computer with Microsoft Excel. Game data can be displayed using an electronic presentation system, a dry erase board, or a chalk board.

OBJECT OF THE GAME

From the student's perspective, the object of the game is to ensure long term sustainable profitability of the WV Wild Ginseng industry. This objective should be stated at the beginning of play and reiterated if students ask during the game.

From the instructor's perspective, the object of the game is to allow students to deal with the apparently conflicting objectives of profit maximization (the implicit goal of

commercial enterprises as taught in colleges of business) and industry sustainability (an explicit goal). If students perceive conflicting goals, the instructor could ask probing questions to help the students explore industry preserving alternatives.

PLAYING "THE GINSENG GAME"

Students will be provided the players manual in advance of the game and instructed to become familiar with the game when they return to class.

The sequence of activities is as follows:

1. Form Teams - Form the class into 4-8 teams of 4-5 players each. To ensure some measure of group activity, discussion, argument, decision making, and consensus, the groups should have a minimum of 3 players. To prevent the free rider problem, team size should not exceed 6 players. 4-5 teams seem optimum, while managing 6-8 is more difficult administratively.
2. Each team will make planning decisions in advance of each harvesting season. These decisions will be: 1) how many new trainees to hire for the season, how much capacity to add for the season, and to develop a harvesting strategy for 5-10 year old ginseng.
3. At the end of each season, the instructor will provide the harvesting results based on a computerized model of the WV wild ginseng population.
4. Students will play the game for up 7 seasons. At the instructor's discretion, students may be asked to provide seasonal plans for several sequential rounds.
5. There are two ways to end the game. In the first version, the instructor will preannounce a specific round in which the game will end. This will be referred to as the "game with a distinct ending." In the second version, the instructor will preannounce the last round in which teams will produce a harvesting plan but that this final plan will be carried forward into future rounds. This will be referred to as the "continuing game." In this case, team performance will be extrapolated for several additional rounds and the effect of those plans will be evaluated using the software.

A comparison of the differences produced by the two different game endings, listed in 5 above, will illustrate how the different incentive act on managerial decision making. Based on past use of similar games, many student groups allow the competitive format of the game to drive decision making. Surpassing rival teams becomes the *de facto* objective to the detriment of the games true objective of long term industry sustainability.

As an instructor, there is a strong tendency to want to save the students from failure. This game is just as likely to teach students through success as it is to teach through failure. The instructor is admonished to allow students to make their own choices and fail if their choices are deficient. Even if students destroy the market for Ginseng, they can be made to learn from their failures in the debriefing.

DEBRIEFING

Wolfe and Byrne observe that the most important part of a game specifically, and experiential learning in general, is the debriefing (Wolfe & Byrne, 1975). The debriefing is the place

to create the learning linkages between thinking and doing. Games are generally fun. They involve an objective, action, and results. They are remembered. If the instructor can help the student create a linkage between the game and theory, the student will retain the theoretical information long term. It is necessary for the instructor to help the student create the linkage, as opposed to telling the student about the relevance of the game, in order for the student to apply it in the future. Even if students fail, there is value in learning why and how they failed. Failure is painful and humiliating. Students will remember it. Failure teaches students the causes of failure and how to avoid it in the future.

USING GAMES TO TEACH THEORY

The Theoretical Model that underlies the game is the same resource depletion model as is used in other games such as the Fish Banks (Meadows, 1990). The Tragedy of the Commons (Hardin, 1968) is the general phenomena that describes why individuals act contrary to the public good. In addition to various games that illustrate the tragedy of the commons, the instructor can use the specific example of the prisoners dilemma or more general examples provided by economic game theory.

CONCLUSION

This game is intended to provide students with a more visual representation of the stock of renewable resources upon which an industry is dependent. It is hoped that the visual cues will inspire students to be more aware of the nature of depletable resources and that this awareness will engage their problem solving abilities so they come up with alternatives that allow them to achieve the games objective of long term industry sustainability.

SAMPLE DEBRIEFING QUESTIONS

1. In this game, did you cause the extermination of wild ginseng in West Virginia? If so, why? What incentives encouraged you to do so? What incentive acted to restrain you from short term profit taking? If you left the industry in a sustainable condition, how did you overcome the incentives for short term profit?
2. When did you realize that this game was not solely a game of competition?
3. What was the role of industry cooperation in the game?
4. What was the role of regulatory oversight or other outside authority in the game?
5. What are the general conditions under which industries will be subject to resource depletion?
6. Provide examples of industries susceptible to resource depletion.
7. How can industries be protected from resource depletion and long term destruction?
8. Given the lessons learned from the game and examples in the real world, is industry self-regulation a viable method for protecting industries?
9. Given the lessons learned from the game and examples in the real world, is government regulation a viable method for protecting industries?
10. What other solutions might exist to prevent resource depletion?

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- The data related to both ginseng and the market for ginseng are largely accurate with minor generalizations for ease of game play. Data was extracted from the following sources:

APPENDIX A: THE WEST VIRGINIA WILD GINSENG GAME PLAYERS MANUAL

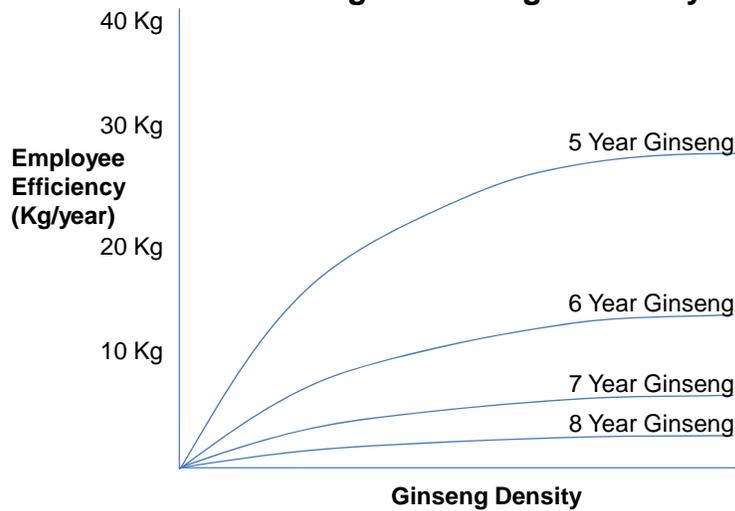
MARKET FOR GINSENG

Ginseng is a slow growing herbaceous perennial plant with a large fleshy root that resembles a small parsnip. It is found in both Asia and North America in mountainous temperate zones. Ginseng requires dense shade and good drainage on hillsides. It does not grow well in flat areas. It can be cultivated but generally takes 5 or more years to reach maturity which reduces its desirability as a crop plant. Ginseng is also considered a high risk because it is highly susceptible to mice, wild turkey, molds, slugs, fungi, rot, and theft. Ginseng can live up to 80 years. Roots generally grow significantly in mature plants reaching lengths of 4-6 inches. The ginseng root is highly valued for its perceived beneficial properties.

Ginseng is believed to have distinctive medical and curative effects and is highly valued by those who practice homeopathic medicine. Various studies have attempted to validate the beneficial effects of ginseng on sexual potency and libido, longevity, diabetes, influenza, and cancer. Controlled scientific studies of the medical efficacy of ginseng are rare and those that exist are of questionable scientific accuracy. Despite this lack of proof, ginseng has been a staple in oriental medicine for centuries and is growing in worldwide popularity.

Ginseng has been known in China for over 5000 years and used as a cure-all for 3000 years. In traditional Chinese medicine, Asian ginseng is viewed as having Yang and the North American ginseng is viewed as having Yin. Beneficial effects are optimized when combined in the proper proportions. This creates a demand for ginseng from both regions. Most North American ginseng is produced in Canada in Ontario and British Columbia and in the USA in Wisconsin.

Ginseng Harvesting Efficiency



Wild ginseng is ginseng that is not planted or cultivated but instead found growing wild wherever pollinated seeds take root. Woods grown ginseng is ginseng that is planted from seed and left to grow wild in the woods. Wild ginseng is believed to have greater beneficial properties than cultivated ginseng. Wild ginseng is becoming quite rare due very high demand, over harvesting, and dwindling supply. Market values for dried wild ginseng can exceed \$1000 per kilogram. The market value for woods grown ginseng is slightly lower than wild ginseng. In North America, both wild ginseng and woods grown ginseng are found in Maine, North Carolina, Tennessee, Virginia, and West Virginia.

Ginseng plants reproduce after reaching 4 years old. The red berries that form on mature plants each produce two seeds. These berries must undergo two seasons before seed germination can occur. Ginseng farmers germinate berries by burying them in sand for one full year before replanting in soil suitable for ginseng growing. Younger plants produce fewer berries while older plants produce many more. Continuous harvesting of 5 year old wild ginseng has a detrimental effect on the ginseng population because of a reduction in the number of the older plants that produce larger quantities of berries.

WILD GINSENG IN WEST VIRGINIA

Ginseng has been harvested in West Virginia for over 200 years. Ginseng grows wild on public and private lands of West Virginia. Harvesting on public lands in state parks, state forests, and nature areas is illegal but is legal on other public lands. Harvesting on private land is permitted with the owner's written permission. Harvesting is legal from 1 September to 30 November. Only plants that are 5 years old, identified by having 3 leaf prongs, and older are permitted for harvesting. Harvesters are required to replant the seeds from ginseng plants in the spot where harvested. Ginseng must be either 1) sold to a registered ginseng dealer by 31 March of each year following its harvest, or 2) certified by the WV Department of Forestry by obtaining a weight receipt which must be kept with the ginseng. It is illegal to possess ginseng between 31 March and 31 August without a weight receipt. Steep fines and prison time are the typical punishment for violating ginseng harvesting regulations. These regulations are intended to allow regeneration of wild ginseng.

YOUR COMPANY

While there are a significant number of independent harvesters of wild ginseng, your company is one of only a few commercial operations operating in West Virginia. You currently have 10 employees who are experienced harvesters. Each employee is capable of finding and processing 40 Kg of ginseng each season. You have a processing, drying and storage facility with a seasonal capacity of 600 Kg of ginseng each year. You cannot take in more than 600 kg without purchasing and building additional seasonal capacity.

WV WILD GINSENG ANNUAL HARVEST

The annual ginseng harvest depends on the number of trained workers engaged in harvesting operations and their harvesting efficiency. Harvesting efficiency is determined by factors such as the density of wild ginseng, ginseng reproduction, the amount of time ginseng is left to grow, the occurrence of blight and other ginseng diseases, and the weather.

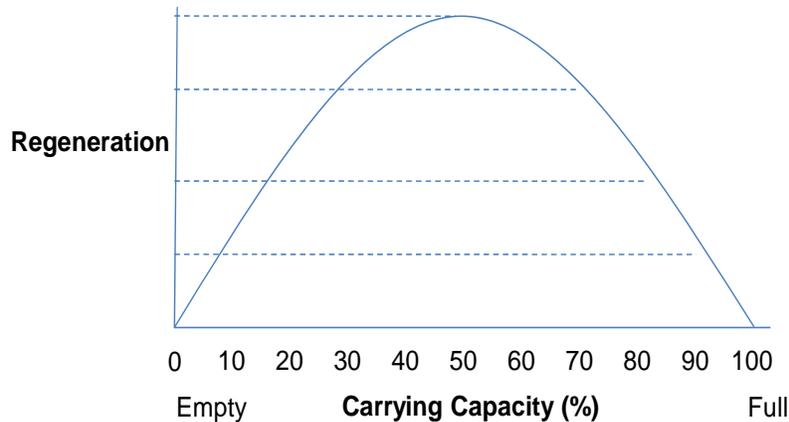
PRICE PER KG

Dried wild ginseng sells for about \$800/kg. Dried woods-cultivated ginseng sells for about \$500/kg. Dried cultivated ginseng sells for about \$50/kg. The price per kilogram of ginseng is determined by an auction market made up of national and international ginseng buyers. Since the total amount of ginseng produced by West Virginia is a small percentage of the global total, West Virginian production has little effect on global prices.

It is illegal to harvest ginseng plants that are less than five years old. The age of ginseng plants can be estimated from the number of leaf prongs, the number of berries, and the size of the plant. Five year old ginseng is identified by having at least three leaf prongs and ten year old ginseng is identified by having four leaf prongs.

The dried weight of ginseng roots increase, by almost 50% per year. Since older plants have substantially larger roots it potentially desirable to delay harvesting as long as possible. This delay is problematic because mature ginseng can be harvested by any company. A mature year-old-plant passed up by one company may be harvested later that season or in the next by another company. Another problem is that older ginseng is more susceptible to molds, fungi, and specific diseases. The

Ginseng Replenishment



older plants can more easily transmit diseases to younger plants, thereby contaminating whole fields.

For these reasons, harvesters may pass up some mature ginseng that is over five years old but they rarely pass up ten year-old-plants. Harvesting plans generally call for the collection of a specific percentage of ginseng roots of various ages; e.g. A plan might call for the collection of 50% of five year-old-plants, 60% of 6 year-old-plants, 70% of 7 year-old-plants, etc. This type of plan leaves some older ginseng to be harvested in future years. It also leave open the possibility that rivals might harvest in the same areas and clean out all the ginseng leaving you no older plant for the future

INTEREST INCOME

If you have a positive bank balance at the end of the season, the bank will pay you interest equal to 10% of your bank balance. I

TOTAL REVENUE

The total annual revenue for your company is your total harvest in kilograms multiplied by \$1000 plus the interest income on positive bank balances.

EMPLOYEES

You start the game with 10 trained employees. Your trained employees are capable of harvesting 40 Kg of ginseng per season. Trained employees know how to identify wild ginseng, are knowledgeable of the locations where ginseng can be found, and can determine the rough age of ginseng so that immature plants are left unmolested or that mature plants can be left to grow another season.

EMPLOYEE TRAINING

It takes a full year of one-on-one training under the direct supervision of a trained harvester to become competent at ginseng harvesting, processing, and drying. During the training period a trainee provides negligible additional capacity over the trained harvester. The one-on-one nature of the training means that your company may never hire more trainees than it has trained harvesters.

LAYOFFS AND TRANSFERS

Your company may reduce its labor force at any time by terminating harvesters. These employees may seek employment at a rival ginseng business anytime within a year and be hired as a fully trained harvester. These employees are free agents and may cause several rival businesses to offer a one-time hiring bonus for the privilege of hiring them. You may not lay off a trainee or harvester in their first year of employment.

LABOR AND EQUIPMENT

Whether trained or not, you spend \$20,000/year on your employees in the form of wages and equipment.

PROCESSING FACILITIES AND STORAGE

Ginseng processing, storage, and drying requires specialized equipment. This equipment may be homemade or manufactured to order. Each 100 kg/year capacity manufactured unit requires a recurring annual expense of \$5000/year. Each 100 kg/year capacity homemade unit requires a recurring annual expense of \$8000/year. This equipment may be traded with other ginseng companies at a negotiated price.

INTEREST EXPENSE

If you have a negative bank balance at the end of the season, the bank will charge you interest equal to 15% of your bank balance.

TOTAL EXPENSES

The total annual expenses for your company are the sum of labor costs, new capacity purchases, recurring capacity costs, and interest expenses.

CUMULATIVE BANK BALANCE AND ANNUAL PROFIT

Your profits are equal to your Revenues minus your Expenses. At the end of each season your Cumulative Bank Balance and Annual Profit will be compared with the other companies in the game.

PLANNING: NUMBER OF NEW HIRES

New employees require a year to become independently productive. During their first year, new employees work

alongside an experienced employee, learning where to find ginseng, how to determine ginseng's age, how to properly harvest ginseng and replant the seeds, and how to prepare ginseng for market. During this year they must be paid. On balance, new employees do some work but distract from the experienced worker by the same amount, resulting in virtually no net gain in harvesting capacity. It is in an employee's second and subsequent years that they start contributing to the ginseng harvesting capacity.

At the beginning of each year, the company must determine the number of new employees they will train in the upcoming year. These new hires sign a contract that guarantees them employment during the training period and for at least one additional year. Once trained, all harvesters have roughly the same harvesting capacity.

PLANNED NEW PROCESSING FACILITIES AND STORAGE

You need to determine how much, if any, new ginseng processing capacity you intend to add each year. This equipment may be homemade or manufactured to order. One local provider of manufactured equipment can produce highly effective units for far less than you can make them. Each manufactured unit with a 100 kg/year capacity initially costs \$20,000 to order. Homemade units can be made for about \$30,000. Each manufactured unit of equipment must be ordered one year in advance to provide time for the manufacturer to build the equipment, ship it to the buyer, and set it up. Homemade equipment can be made and used during the current year.

PLANNED HARVESTING

Because older ginseng grows to a larger size and therefore earns significantly more revenue when sold, you can set harvesting goals which your harvesters will implement. You can specify the percentages of 5-10 year old ginseng that your harvesters will collect. If you specify a harvesting target for six year old ginseng of 60%, that effectively means your harvesters will collect about 60% of the six year old ginseng they find and leave 40% for future seasons. You will specify harvesting targets for ginseng in the range from 5-10 years old. It is unusual to find ginseng older than 10 years old, so your harvesting target for 10 year old ginseng is effectively 100%.

STEPS OF PLAY

1. Lay off workers from previous season.
2. Bid for experienced workers.
3. Chose the number of new harvesters to hire.
4. Trade equipment.
5. Chose the amount of new capacity to purchase or build homemade.
6. Determine your harvesting plan for the upcoming season.

7. At the beginning of the season, send workers out to harvest ginseng.
8. At the end of the season, your instructor will provide the results of the harvest.
9. Reconcile your annual revenues and expenses to determine your end of season bank balance.

ORDER OF FINANCIAL TRANSACTIONS

For computational purposes, financial transactions will be as follows:

1. Start the year with your bank balance carried from the previous season.
2. Pay for new homemade capacity intended for this season.
3. Calculate the financial effect of equipment trades.
4. Pay for labor expenses.
5. Your instructor will provide you with the results of the ginseng harvest.
6. Calculate revenue from the sale of ginseng harvest.
7. Pay for new manufactured capacity ordered for next season.
8. Calculate interest revenue or expenses based on end of year bank balance.
9. Calculate end of year bank balance.

REFERENCES USED IN DESIGN OF GAME

The following sources were used to design the game. The data related to both ginseng and the market for ginseng are largely accurate with minor generalizations for ease of game play.

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THE GINSENG GAME COMPANY WORKSHEET

	Preseason	Season 1	Season 2	Season 3	Season 4	Season 5	Season 6	Season 7
REVENUE								
Ginseng Annual Harvest								
Ginseng Price (\$USD/Kg)								
Revenue from equipment trades								
Interest income								
Total Revenue (\$USD)								
EXPENSES								
Expenses from equipment trades								
Trained Employees (#)								
Trainees (#)								
Seasonal Labor& Equip. Expenses								
Current Manufactured Capacity (Kg)								
Current Homemade Capacity (Kg)								
Seasonal Capacity Charges								
New Capacity Charges								
Interest Expense								
Total Expenses (\$USD)								
BANK BALANCE								
PLANNING								
Trained employee premium (if any)								
# of trainees hired								
New Manufactured Capacity (Kg) purchased								
New Homemade Capacity (Kg) purchased								
Harvest 5 year ginseng								
Harvest 6 year ginseng								
Harvest 7 year ginseng								
Harvest 8 year ginseng								
Harvest 9 year ginseng								
Harvest 10 year ginseng								

THE GINSENG GAME COMPANY WORKSHEET

	Season 8	Season 9	Season 10	Season 11	Season 12	Season 13	Season 14	Season 15
REVENUE								
Ginseng Annual Harvest								
Ginseng Price (\$USD/Kg)								
Revenue from equipment trades								
Interest income								
Total Revenue (\$USD)								
EXPENSES								
Expenses from equipment trades								
Trained Employees (#)								
Trainees (#)								
Seasonal Labor& Equip. Expenses								
Current Manufactured Capacity (Kg)								
Current Homemade Capacity (Kg)								
Seasonal Capacity Charges								
New Capacity Charges								
Interest Expense								
Total Expenses (\$USD)								
BANK BALANCE								
PLANNING								
Trained employee premium (if any)								
# of trainees hired								
New Manufactured Capacity (Kg) purchased								
New Homemade Capacity (Kg) purchased								
Harvest 5 year ginseng								
Harvest 6 year ginseng								
Harvest 7 year ginseng								
Harvest 8 year ginseng								
Harvest 9 year ginseng								
Harvest 10 year ginseng								