THE FEASIBILITY OF RETAINED OWNERSHIP STRATEGIES FOR
COW-CALF PRODUCERS

by

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Abstract

Retained ownership can generally be described as when a producer does not sell his or her calf crop immediately after weaning but keeps the calves for an extended period of time. This is a decision that is made by the cow-calf producer every year and may or may not change from year to year. For some, the decision is based on past practices while others will evaluate the market before making a decision. There are various levels of retained ownership that can be modified to fit a producer's operation and can range from a preconditioning program to finishing the cattle in the feedlot. This study specified various retained ownership scenarios in order to be able to analyze the situations.

Budgets were used to analyze the optimum phase of production at which to sell calves that is most profitable while taking risk into consideration. Specifically, budgets were developed for scenarios of four cow-calf herds, four backgrounding phases, two grazing phases, and six custom feedlot phases. These budgets were used to produce sixteen potential retained ownership scenarios. The scenarios range from selling the calves immediately after weaning to owning the cattle through finishing at the feedlot. Each scenario was then analyzed based on the net returns over a 10-year period. Additionally, the scenarios were analyzed based on net returns over feed costs.

Target MOTAD was used to analyze the risk component of the scenarios. Although most of the net returns were negative for all scenarios, retained ownership showed a trend of improving net returns. However, along with the improved returns came a greater variability in returns which is unattractive to a risk adverse producer. Target MOTAD results on a net return basis selected the cow-calf only phase of production in all scenarios.

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Dedication

I would like to dedicate this research to my father and mother, G.M. (Corky) and Jeri Albright, for their encouragement and support throughout, not only this phase of my life, but everything I have ever worked towards. Growing up on the family farm has made me the person that I am today as I learned many important lessons. The work was not always fun, but I would not trade it for the world as some of my best memories involve the family farm. Through life on the farm, my parents instilled in me a sense of hard work and good morals that will serve me well in the future. I could not have asked for better role models in my life. Although they may not know it, my parents can take credit for all of my accomplishments thus far and in the future.

CHAPTER 1 - Introduction

1.1. Background

Retained ownership is not a new concept by any means, but many producers are hesitant to take it on for numerous reasons. For example, they are unclear as to what exactly retained ownership is, they do not understand the potential economic benefits, or they do not want the added risk. This study is intended to alleviate some of those questions and concerns that producers have about retained ownership. This is an especially important topic currently with respect to the condition of the market.

An article by Potts (2010) in Beef Today describes how now may be the ideal time to retain ownership of calves due to the lowest cowherd numbers on record causing an increase in demand for beef which has resulted in higher cattle prices. Due to the large lag time in increasing the beef supply, this trend could last for the next three to five years. However, the article by Potts warns that retaining ownership is "not for the faint of heart." Although cattle prices may be higher, volatility will always be present in the market.

Retained ownership cannot be defined with only one description. There are numerous ways and amounts of time that a producer could retain their calves. For example, a producer could choose to only precondition their calves for a certain amount of time. According to Dhuyvetter (2004), preconditioning is when the producer "prepares" the calves for backgrounding, grass, or a feedlot by using different management practices to improve the calf's health and value, such as by vaccinating, dehorning, and castrating. There is no set length of time for preconditioning, but according to Fulton et al. (2002) it is typically a 30-45 day program. At this point, a producer could then decide to sell or background the calves after they have been preconditioned. If they choose to background the calves, this usually entails feeding

the calves in a dry lot setting for a length of time. Again, there is no set amount of time for backgrounding; it all depends on the preferences of the producer and market conditions. The goal of backgrounding is to grow the cattle but not fatten them yet. When the backgrounding portion is completed, the producer has several options; he or she can sell the calves, put them on grass for the summer, or send them to a feedlot. This decision will depend on the producer's preferences, the size and condition of the cattle, and market conditions. If the cattle have a light weight, the producer may decide to send them to grass. The goal of this strategy is to add weight at a low cost. This usually occurs from May 1st to September 1st. At the end of the grazing season, the producer can then either sell the calves or send them to a feedlot. If the producer decides to retain ownership and send them to a feedlot, the calves will be fed a high grain ration and then sold when finished. This time period ranges from 90 to 180 days, on average, depending on the size and condition of the feeder when it enters the feedlot.

The decision to retain ownership must be made after careful consideration of both the advantages and risk associated with retaining cattle. Anderson et al. (2009) discuss the advantages of retaining ownership. These include eliminating the middle-man which can lower costs and increase profits. Also, risk can be spread out over more than one period. In addition, if a production stage does not appear to be profitable, the next production stages may be profitable. Producers can gain a tax advantage because they are allowed to transfer taxable income to the next year. However, the article also recognizes the many different factors that have to be taken into consideration when determining whether to retain ownership or not. Management requirements will be increased, income will be delayed, and production costs will be increased when additional production periods are added. It is very important that producers can project

their costs and be able to set up a budget to see if they will profit or not. Also, producers must keep up to date on the current economy, the cattle cycle, and the livestock and grain markets.

A producer's risk preference plays a vital part in the decision to retain ownership or not. Risk aversion is a person's tendency to avoid taking on risk. There are varying degrees of risk aversion; from risk hating (very risk averse) to risk loving (not risk averse). Every person falls on a different point on the spectrum.

Retained ownership is a very important decision for a producer to make. It has a large impact on the operation's income, risk level, and time commitment. A producer must take all of these things into consideration when making this important decision. The big question is, are they willing to take all of this on in order to potentially increase their income? Hopefully, this study will inform producers and help them to make this decision.

1.2. Objectives

The objectives of this thesis are as follows:

1.) Develop beef cow, backgrounding, and cattle finishing budgets that can be used to examine retained ownership strategies by beef cow producers.

2.) Using a risk model, determine the optimal retained ownership strategy for representative beef cow producers.

3.) Compare the profitability and riskiness of specific retained ownership strategies to the optimal strategies.

1.3. Organization of Thesis

This thesis is broken into several different sections by chapters. Chapter 2 provides a review of the previous literature that has examined retained ownership. Chapter 3 discusses the methods used for model formulation. Chapter 4 describes in detail the production scenarios

assumed, the formulation of the budgets for each production scenario, and the data used to do so. Chapter 5 is a discussion of the analysis process, how it was conducted, and the summary of the results of the analysis. Finally, Chapter 6 outlines the conclusions from this research and suggestions for further research.

CHAPTER 2 - Literature Review

The decision to retain ownership of cattle is very important for producers. It can vastly change the net income they receive and the risk they take on. Numerous previous studies have examined various forms of retained ownership. These studies are discussed below.

2.1. Cow-Calf Production

The success of backgrounding begins with the cow-calf operation. If the cow-calf segment is not producing calves efficiently, then it is harder for the backgrounding operation to succeed. In 2005, Ramsey et al. conducted a study with three models: cost, production, and profits. Calving percentage was the only variable that was significant in all three models. It decreased per-unit costs, increased production, and increased profits. The study concluded that this proves the importance of reproductive efficiency to success and preservation of the operation.

Previous studies show that many producers do not retain ownership of their calves but sell them immediately after weaning. In a survey study by Hodur et al. (2007) involving North Dakota, South Dakota, Montana, and Wyoming, it was reported that 75% of respondents sell either some or all of their calves at weaning. Of the reported calves in the study area, approximately 61% were sold at weaning.

Producers have many different choices with respect to managing their cow-calf herd. They can calve in the fall, early spring, late spring, or any other time of the year; these are just the most common calving periods. Producers can also choose to wean the calves early, late, or at the typical weaning age. A study by Kruse et al. (2008) looked at the differences in gross margin of calving in late winter (average February 8), early spring (average April 5), and late spring (average May 31) and weaning early (190 days for late winter and early spring and 140 days for

late spring) or late (240 days for later winter or early spring and 190 days for late spring). The study found that late spring calving tended to have higher gross margins than late winter calving or early spring calving. This may be because of the higher feed costs for late winter and early spring calving. Late spring calving has been suggested as a means of lowering cow feed costs by better utilizing available grazed forage nutrition. Also, within the same calving season, weaning calves later tended to be more profitable.

There are numerous factors that are involved in determining a producer's decision to retain ownership. A study by Ward et al. (2008) surveyed producers about their management practices, gave them educational information, and then surveyed the producers later to see how their management practices had changed. The survey found that larger producers with the majority of their income coming from the livestock enterprise are more likely to accept and use suggested practices. They identified 17 practices to further analyze and determined the factors that influence their implementation. The 17 practices that were studied were use of implants in steers, length of hay feeding season, soil testing, forage testing, stockpiling forages, calf vaccination, animal identification, pregnancy checking, bull breeding soundness exams, breeding season length, existence of a long-term plan, record-keeping method, and cash flow planning. A model was set up for each practice with multiple factors or variables. Reducing labor was the factor that was significant in the most models. Off-farm employment was the only factor not significant in any of the models.

It is important to know the typical time period for a region to calve as this may have an effect on the applicable management and marketing practices. A survey of KFMA producers by Pope (2009) showed that 75% of producers surveyed calve in the spring. The survey also indicated that 27.5% of producers reported always selling steers at weaning. This statistic is

vastly different from the survey by Hodur et al. (2007) but note that the statements specify "some" and "always". Also, the areas in which the surveys were conducted differed. The survey also reported that those who do sell their calves after weaning seem to have a comparative advantage in business planning skills, lower total assets, and are less diversified.

2.2. Preconditioning

Preconditioning is not a widely accepted practice due to contradicting research on its benefits and the large differences in operations. However, recent demand issues in the beef industry may push for more acceptance of preconditioning. Practices such as value-based marketing, food safety, source verification, and consolidation are benefited by preconditioning calves.

Although there is resistance to the program, there is evidence that more people may be willing to implement it. A survey by Little, Forrest, and Lacy (2000) compared large and small producers' management and production practices. It found that 63% of all producers said they would be willing to execute both a pre-weaning health program and a preconditioning program after weaning. Also, larger producers are more likely to implement the practices used in a preconditioning program than the smaller operations.

One question that producers have about preconditioning is related to profitability. If it is not profitable, they would not want to implement this practice in their operation. A study by Dhuyvetter (2004) examined whether preconditioning is profitable by comparing the prices at a special sale for preconditioned calves and a regular sale during the same week. Calves sold in the fall at the special sale received $4.62/cwt or $25.92/head more on average than calves sold at the regular sale of the same week. Calves sold in the winter at the special sale received $3.22/cwt or $19.72/head more on average than calves sold at the regular sale during the same

week. The preconditioned calves received a higher price in both the fall and winter, although the

calves sold in the fall received a slightly higher premium. However, this only shows that

preconditioned calves receive a higher price; it does not prove that they are more profitable. In

this study, a budget was also built to determine the profitability of preconditioning. After

factoring in costs, the net return to preconditioning was approximately $14.16/head.

2.3. Backgrounding

As mentioned earlier, backgrounding can take on various forms. Numerous studies have

looked at the factors influencing producers to retain ownership. These studies and their findings

are discussed below.

In 1998, a study by Popp, Faminow, and Parsch determined the factors that impact the

decision to retain ownership. Results showed that, among many other things, if a producer has

more land, they are more likely to background their calves. There was also a positive correlation

between the effort in watching market prices and backgrounding. Producer perceptions of

profitability, risk, and facilities were also important. Factors that were not important included

size of the operation, human capital, cost of financing, and land quality. As can be seen from

these results, there is not one single thing that impacts a producer's decision; it is a combination

of many different factors.

Surveys can provide a plethora of information about producers' current practices and

attitudes. Knowing this information can help us understand why producers are or are not using

retained ownership. The survey by Hodur et al. (2007), mentioned previously, reported that

respondents in the North Dakota, South Dakota, Montana, and Wyoming area retained calves

for, on average, 4.8 months after weaning. When respondents ranked the most important criteria

for retaining calves on their ranch, the top responses were: for replacement heifers, retain all

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calves, based on current conditions, and retain the lightest calves. The two most common

reasons why respondents did not retain ownership were "drought conditions have created feed

shortage" (67%) and "do not have adequate feedlot capacity" (56%). Approximately 62% of the

respondents agreed that "the availability of feed and forage is the biggest impediment to

retaining feeder calves." Approximately 38% of respondents indicated the number of calves

retained in the survey area had decreased in the last 5 years by almost half due to drought

conditions (91% of respondents) and inadequate feed supply (54% of respondents). Over 2/3 of

the large ranches (over 300 head) retain at least some calves while less than half of small ranches

(less than 100 head) retain ownership of at least some calves. Larger operators were less likely

to see weather conditions as a problem, to feel they lacked knowledge of feeding cattle, and to

see money as a problem. The survey showed that the operator's age did not impact the decision

to retain calves. However, those with a college education tended to retain calves more

frequently. Also, when 50% or more of the income came from the livestock enterprise, calves

were retained more often.

Backgrounding success may depend on the size, condition, or weight of the cattle. The

study by Kruse et al. (2008), mentioned earlier, varied the backgrounding and finishing scenarios

to determine the most profitable weight class for backgrounding. For the calves entering

backgrounding, gross margin per steer was greatest for calves born in the late spring and weaned

early (140 days) and lowest for calves born in the late winter and weaned either early (190 days)

or late (240 days). This suggests that steers were more profitable when they entered

backgrounding at a lighter weight.

The survey by Pope (2009), mentioned previously, reported that of those spring calving

producers who sell in November at weaning, 35% would consider retaining ownership until

March if expected net return was 10% higher. The most popular reason to retain ownership, with 36% marking this reason, was "see the risk worthwhile to earn the potential of more $/head." The number one reason given for not retaining ownership was "don't want to take the risk involved with owning while in the feedlot" with 47% giving this response. The survey also looked at producers who consider themselves to have a comparative advantage in certain areas. When a producer has a comparative advantage in new technology or marketing skills, the probability that they will retain steers through the finishing phase increases. Those who are willing to participate in value-added programs, if it increased returns, have a comparative advantage in marketing skills, have a larger herd, are less diversified, and were also more likely to retain ownership.

Franken et al. (2010) used a 2008 survey of Missouri cattle producers to look at the links between producer characteristics, interest in retained ownership, and actual retained ownership. Results showed that those who were more interested in retained ownership were younger producers, those with registered cattle, and those interested in performance data. Of the producers surveyed, 37% retain ownership more than 60 days post-weaning, 21% sell within 2 weeks of weaning, and 14% retain ownership until slaughter. These results show a breakdown of what producers are actually doing with their calves after weaning. Also, it is interesting to note that as the age of the producer increases, interest in and length of retained ownership decreases.

2.4. Grazing

Placing cattle on grass during the summer months may be a very important part of retained ownership, depending on the location. For example, in Kansas near the Flinthills, grazing steers is very popular.

Lambert (1989) studied optimal decisions regarding calf retention. One option was to feed calves all winter and then sell them after grazing all summer. This option caused the winter rate of gain to be reduced compared to other options in order to maximize the use of the summer grass. Depending on the expected output price, the winter gain cost changed. If output price was expected to be high, winter gain was increased in order to maximize ending weight. If output price was expected to be low, then winter gain was minimized in order to keep costs low.

2.5. Finishing

Few producers retain ownership through the feedlot phase. This may be due to the increased risk and financial needs associated with this option. Many producers are unaware of the potential profits they could receive. Studies briefly discussed below look at the finishing phase and its possible profits.

Profitability in the feedlot phase can be dependent on many different factors, one of which may be placement weight. In 1992, Langemeier, Schroeder, and Mintert conducted a study of cattle finishing profitability. They found that lighter weight placements had lower gross returns but higher profits compared to heavier weight placements.

The size of the operation may impact a producer's decision to retain ownership until slaughter. The Mississippi survey by Little, Forrest, and Lacy (2000), mentioned previously, found that larger producers tend to retain ownership to the feedlot phase more often. Only about 7% of all producers in the survey retained ownership through the finishing phase while almost half of the largest producer group did. This may be due to the lot size requirement or the need for a larger capital investment in order to be able to retain ownership through finishing.

Producers may be unaware of the potential profit increase if they choose to retain ownership until the finishing phase. In 2001, Carlberg and Brown studied the profitability of six

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alternative practices: cow-calf operation only (CC), cow-calf and custom backgrounding (CC-B), cow-calf, custom backgrounding, and custom finishing (CC-B-F), backgrounding only (B), finishing only (F), and backgrounding and finishing (B-F). The CC-B-F and F practices were the only ones to average a profit over the 20 years of data in the study. Although the CC-B-F option had a higher profit than the F option, it had a much larger standard deviation. Producers have to take into consideration the increased risk along with the potential increased profits when deciding whether to retain ownership of their calves.

Those calves that enter the feedlot having gone through a preconditioning or backgrounding program and received the proper vaccinations are more likely to be more profitable than those who have not received vaccinations. In a study by Fulton et al. (2002), the health of calves entering the feedlot was compared to their performance in the feedlot. Those calves who received one treatment while in the feedlot returned $40.64 per head less than the calves that were not treated. Likewise, calves who received two treatments returned $48.35/head less and calves who received three or more treatments returned $291.93/head less than calves that were not treated. This study reveals the importance of proper vaccinations and other health care.

The study by Hodur et al. (2007), mentioned earlier, recognizes the usefulness of producers receiving information about their animals' end performance as this information could help producers to be more profitable by helping them know which practices are best. In order to receive this information, producers would need to either retain ownership or have access to the information on their cattle after they are sold to get the information from the feedlot and slaughter house. But according to Hodur et al. (2007), only 9% of respondents retained ownership through the finishing and slaughter phase. Over 2/3 of those who retained ownership,

received the performance/carcass data. Approximately 84% of those who received performance data used the information to make management and marketing decisions for the future. The survey also reported an interest among producers, about 14%, to increase the number of calves kept through finishing.

Producers who do retain ownership through the feedlot phase tend to have some differences and advantages that allow them to take on the added risk. Pope's (2009) survey found that producers who keep steers through finishing tend to have a comparative advantage in new technology and marketing skills.

2.6. Risk

Even if producers know that retaining ownership, on any level, has the potential to increase profits, the added risk of implementing this is enough to stop producers. This section reviews the literature that has looked at the relationship between risk and retained ownership.

A study by Van Tassell et al. (1997) looked at six different decision periods for retaining ownership of cattle in which producers could sell at different time periods. Risk aversion was also incorporated into the model. They found that the optimal decision changed depending on different management practices, genetics, time periods, risk aversion, etc. Thus, there was not one best decision that fit every situation or producer. Also, the study showed that as risk aversion increased (more risk averse), producers were less likely to retain ownership of their calves.

A study by Popp, Faminow, and Parsch (1998) determined the factors that impact the decision to retain ownership. Risk was an important factor in the decision to background or not. It was reported that those who are not worried about risk (less risk averse) will use value added practices in their operation.

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A study by Fausti et al. (2003) found that although retaining ownership generates more revenue than selling calves at weaning, per head variability is greater with retained ownership. Depending on a producer's risk preference, he or she must decide whether to take the risk or not. The study evaluated two types of risk: systematic and unsystematic. According to Fausti et al. (2003), systematic risk is uncontrollable and includes such things as market prices, feed costs, interest rates, and weather conditions. However, there are risk management tools available to help manage, but not control, this risk such as hedging and insurance. Unsystematic risk is controllable and includes carcass and calf quality, feedlot selection, and feedlot production performance. There are no tools available for unsystematic risk management as they are already controllable risks. The model showed the systematic risks that had the greatest impact on the rate of return variability were average feed cost per day, market price for fed cattle, and market price for 500 pound calves at time of feedlot placement. The model showed the unsystematic risks that had the greatest impact on the rate of return variability were average daily gain, average feedlot overhead cost per day, carcass quality grade, and carcass dressing percentage. In the model, unsystematic risk accounted for 66.7% of the variability in the rate of return while systematic risk only accounted for 8.6% of the variability. The study concluded that in order to diminish unsystematic risk, producers should increase the uniformity of their calf crop and select a feedlot based on cost efficiency. Also, since retained ownership has too much risk for some, producers need advice from experts on how to reduce the risk in order to convince them to implement this practice.

Most producers do not know their risk preference or how to figure out what it is. In the study by Pope (2009), methods were developed to measure risk preference. The results showed that 36.0% of Kansas producers were very risk averse, 49.6% were somewhat risk averse, 12.1%

were risk neutral, 2.2% were somewhat risk preferring, and 0.4% were very risk preferring. As producers get older, their risk preference decreased or they became more risk averse. The survey also looked at risk aversion of producers and found that those who are more risk averse have a tendency to not retain ownership and sell their steers at weaning. This is due to the added risk of retaining ownership which comes from added expenses and labor. The larger a producer's risk preference or the less risk averse they became, the more assets and cattle a producer owns. Producers, who took part in value-added programs, were less risk averse. Interestingly, those who received performance data and a return for genetic progress were less risk averse; however, producers who received carcass information were more risk averse. Producers who keep steers through the finishing phase were less risk averse.

2.7. Target MOTAD

There are numerous models that could be used to model risk. The Target MOTAD (Minimization Of Total Absolute Deviation) model focuses on downside risk (Watts, Held, and Helmers (1984)). Target MOTAD maximizes mean income constrained by the total negative deviations measured from a target instead of the mean. This analysis tool uses mean-semivariance instead of mean-variance to analyze risk. A semi-quadratic utility function is used in Target MOTAD because it shows that very high returns are not undesirable. This is a more advantageous method because variance considers both very high and very low returns as unattractive; whereas, semivariance only considers low returns as undesirable. With the Target MOTAD model, since a common target is set for the risk reference point, a ranking of plans can be readily determined. Also, the tradeoff between risk and return can be examined.

CHAPTER 3 - Methods

3.1. Budgets

Four systems of budgets for cow-calf, backgrounding, grass, and custom feedlot scenarios were created. Cow-calf, backgrounding, and grass budgets were based on Farm Management Guides from the Department of Agricultural Economics Extension Service at Kansas State University. Specifically, four cow-calf budgets (CC1-CC4) were created based on the "Farm Management Guide: Beef Cow-Calf Enterprise" by Dhuyvetter, Langemeier, and Johnson (2009). Four backgrounding budgets (B1-B4) were created based on the "Farm Management Guide: Drylot Backgrounding of Beef" by Dhuyvetter and Langemeier (2009a). Two grass budgets (G1 and G2) were created based on the "Farm Management Guide: Summer Grazing of Steers in Eastern Kansas" by Dhuyvetter and Langemeier (2009b). Six custom feedlot budgets (FC1-FC6) were created based on the closeout information that a producer would receive from a feedlot. Also, the "Farm Management Guide: Finishing Beef" by Dhuyvetter and Langemeier (2009c) was referenced for the custom feedlot budgets.

Ten years of data were utilized to model risk. Years 2000-2009 were used for the cow-calf budgets and years 2001-2010 were used for the backgrounding, grass, and feedlot budgets. The cow-calf budgets are lagged a year behind the other production phases because the calf for these phases was produced in the prior year. The very end of year 2000 is used for backgrounding budgets B1 and B2 because the calf is weaned in October of the cow-calf production year and is sent directly into a backgrounding situation. Therefore, November and December prices for the year the calf was born must be used for part of these backgrounding budgets.

3.2. Target MOTAD

The goal of Target MOTAD is to maximize returns subject to constraints pertaining to the relationship between annual returns and a target income. Table 3.1 provides an example of how the Target MOTAD model was set up for this research.

In reference to Table 3.1, X, Y, and Z refer to three production practices. However, in order for Y to be performed, X must first occur. Additionally, in order for Z to be performed, X and Y must first occur. Under columns X, X-Y, and X-Y-Z, are the net returns to each system for 10 years. The optimal mix of these three scenarios must sum to one. The Solver Analysis feature in Excel is used to run the Target MOTAD. The objective function is the sum of the optimal solutions of each scenario multiplied by the expected return for that scenario. The numbers in the row Optimal and columns Yr 1 through Yr 10 are the deviations for each year that are less than, or in this case more negative than, the target. The deviation constraint (Dev) is used to trace out the frontier. This constraint is initially set to be equal to or less than 1,000 which is then incrementally decreased to find if there are other optimal solutions. These optimal solutions are used to trace out the frontier or the tradeoff between risk and return.

The Target MOTAD model was used to generate Risk-Income Frontiers from the results on a per cow basis. Frontiers were analyzed for each scenario for both net returns and returns to feed costs. Net returns are calculated using all costs, including opportunity cost. Returns over feed costs are calculated using only feed costs.

Table 3.1: Example of Target MOTAD

	X	X-Y	X-Y-Z	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Total	Obj Fnct
Optimal	1	0	0	26.72	29.15	56.30	0.00	0.00	0.00	0.00	42.04	87.92	70.50	1.00	-266.00
Yr 1	-291.72	-284.91	-273.17	1.00										-265.00	
Yr 2	-294.15	-314.90	-361.16		1.00									-265.00	
Yr 3	-321.30	-324.21	-266.68			1.00								-265.00	
Yr 4	-233.81	-280.74	-172.68				1.00							-233.81	
Yr 5	-147.37	-173.87	-169.17					1.00						-147.37	
Yr 6	-155.20	-143.60	-206.92						1.00					-155.20	
Yr 7	-220.97	-294.37	-285.37							1.00				-220.97	
Yr 8	-307.04	-372.22	-360.87								1.00			-265.00	
Yr 9	-352.92	-379.40	-441.54									1.00		-265.00	
Yr 10	-335.50	-346.32	-287.78										1.00	-265.00	
Dev				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	312.63	
Exp Return	-266.00	-291.45	-282.53												

CHAPTER 4 - Data and Budgets

4.1. Production Systems

Table 4.1 lists and describes the notation that will be used in this thesis. There are six retained ownership scenarios. Since all or part of each scenario could occur, there are sixteen possible scenarios for a producer to select. Figures 4.1 through 4.6 describe the potential combinations of production phases that could occur.

Figure 4.1 describes a situation in which the calf is born on or between February 1st and March 31st. The calf is weaned from the cow on October 31st with the steers and heifers weighing 540 pounds and 500 pounds, respectively. At this point the steers and heifers are separated and fed accordingly. The calf is then placed in a backgrounding situation for 75 days until January 14th. The steers gain 2.51 pounds per day and the heifers gain 2.15 pounds per day. At the end of this phase, the steers will weigh 728 pounds and the heifers will weigh 661 pounds. The calf is then sent to a custom feedlot where it is finished for slaughter. The steers will be in the feedlot for 159 days from January 15th to June 23rd during which they time will gain 3.38 pounds per day. The steers will finish at a weight of 1266 pounds. The heifers will be fed for 158 days from January 15th to June 22nd during which time they will gain 2.98 pounds per day. The heifers will finish at a weight of 1132 pounds. The steers and heifers have one day difference in the feedlot because their days on feed were based on their closeout month from separate seasonality charts for steers and heifers. At any of the points between the stages of this process, the owner may sell the calf.

Figure 4.2 describes a situation in which the calf is born on or between April 1st and May 31st. The calf is weaned from the cow on October 31st with the steers and heifers weighing 495 pounds and 455 pounds, respectively. At this point the steers and heifers are separated and fed

Table 4.1: Notational Descriptions

Notation	Description	Time Range
CC1	Spring calving cow-calf herd, earlier calving	Calve: Feb. 1 to Mar. 31 Wean: Oct. 31
CC2	Spring calving cow-calf herd, later calving	Calve: Apr. 1 to May 31 Wean: Oct. 31
CC3	Fall calving cow-calf herd, earlier calving	Calve: Sept. 1 to Oct. 31 Wean: Apr. 30
CC4	Fall calving cow-calf herd, later calving	Calve: Oct. 1 to Nov. 30 Wean: Apr. 30
B1	Background early spring calves	Nov. 1 to Jan. 14
B2	Background late spring calves	Nov. 1 to Jan. 14
B3	Background early fall calves	May 1 to July 14
B4	Background late fall calves	May 1 to July 14
G1	Grass for early fall calves	May 1 to July 14
G2	Grass for late fall calves	May 1 to July 14
FC1	Custom Feedlot, early spring calves	Jan. 15 to June 22
FC2	Custom Feedlot, late spring calves	Jan. 15 to June 22
FC3	Custom Feedlot, early fall calves, backgrounded	July 15 to Dec. 5
FC4	Custom Feedlot, late fall calves, backgrounded	July 15 to Dec. 5
FC5	Custom Feedlot, early fall calves, grass	July 15 to Dec. 5
FC6	Custom Feedlot, late fall calves, grass	July 15 to Dec. 5

Figure 4.1: CC1-B1-FC1

Figure 4.2: CC2-B2-FC2

CC2 → B2 → FC2

Figure 4.3: CC3-B3-FC3

CC3 → B3 → FC3

Figure 4.4: CC3-G1-FC5

CC3 → G1 → FC5

Figure 4.5: CC4-B4-FC4

CC4 → B4 → FC4

Figure 4.4: CC4-G2-FC6

CC4 → G2 → FC6

accordingly. The calf is then placed in a backgrounding situation for 75 days until January 14th.
The steers gain 2.51 pounds per day and the heifers gain 2.15 pounds per day. At the end of this
phase, the steers will weigh 683 pounds and the heifers will weigh 616 pounds. The calf is then
sent to a custom feedlot where it is finished for slaughter. The steers will be fed for 159 days
from January 15th to June 23rd during which they will gain 3.38 pounds per day. The steers will
finish at a weight of 1221 pounds. The heifers will be fed for 158 days from January 15th to June
22nd during which they will gain 2.98 pounds per day. The heifers will finish at a weight of 1087
pounds. At any of the points between the stages of this process, the owner may sell the calf.

Figure 4.3 describes a situation in which the calf is born on or between September 1st and
October 31st. The calf is then weaned on April 30th with the steers and heifers weighing 515
pounds and 475 pounds, respectively. At this point the steers and heifers are separated and fed
accordingly. The calf is then placed in a backgrounding situation for 75 days until July 14th.
The steers gain 2.51 pounds per day and the heifers gain 2.15 pounds per day. At the end of this
phase, the steers will weigh 703 pounds and the heifers will weigh 636 pounds. The calf is then
sent to a feedlot where it is finished for slaughter. The steers will be fed for 143 days from July
15th to December 5th during which they will gain 3.63 pounds per day. The steers will finish at a
weight of 1222 pounds. The heifers will be fed for 144 days from July 15th to December 6th
during which they will gain 3.26 pounds per day. The heifers will finish at a weight of 1106
pounds. At any of the points between the stages of this process, the owner may sell the calf.

Figure 4.4 describes a situation in which the calf is born on or between September 1st and
October 31st. The calf is then weaned on April 30th with the steers and heifers weighing 515
pounds and 475 pounds, respectively. At this point the steers and heifers are separated and fed
accordingly. The calf is then placed on grass for 75 days from May 1st to July 14th. During this

period, the steers and heifers will gain 2.25 and 2 pounds per day, respectively, and weigh 684 and 625 pounds, respectively, at the end of grass time. After grass, the calf is sent to a feedlot where it is finished for slaughter. The steers will be fed for 143 days from July 15th to December 5th during which they will gain 3.63 pounds per day. The steers will finish at a weight of 1203 pounds. The heifers will be fed for 144 days from July 15th to December 6th during which they will gain 3.26 pounds per day. The heifers will finish at a weight of 1094 pounds. At any of the points between the stages of this process, the owner may sell the calf.

Figure 4.5 describes a situation in which the calf is born on or between October 1st and November 30th. The calf is then weaned on April 30th with the steers and heifers weighing 490 pounds and 450 pounds, respectively. At this point the steers and heifers are separated and fed accordingly. The calf is then placed in a backgrounding situation for 75 days until July 14th. The steers gain 2.51 pounds per day and the heifers gain 2.15 pounds per day. At the end of this phase, the steers will weigh 678 pounds and the heifers will weigh 611 pounds. The calf is then sent to a feedlot where it is finished for slaughter. The steers will be fed for 143 days from July 15th to December 5th during which they will gain 3.63 pounds per day. The steers will finish at a weight of 1197 pounds. The heifers will be fed for 144 days from July 15th to December 6th during which they will gain 3.26 pounds per day. The heifers will finish at a weight of 1081 pounds. At any of the points between the stages of this process, the owner may sell the calf.

Figure 4.6 describes a situation in which the calf is born on or between October 1st and November 30th. The calf is then weaned on April 30th with the steers and heifers weighing 490 pounds and 450 pounds, respectively. At this point the steers and heifers are separated and fed accordingly. The calf is then placed on grass for 75 days from May 1st to July 14th. During this period, the steers and heifers will gain 2.25 and 2 pounds per day, respectively, and weigh 659

and 600 pounds, respectively, at the end of grass time. After grass, the calf is then sent to a feedlot where it is finished for slaughter. The steers will be fed for 143 days from July 15th to December 5th during which they will gain 3.63 pounds per day. The steers will finish at a weight of 1178 pounds. The heifers will be fed for 144 days from July 15th to December 6th during which they will gain 3.26 pounds per day. The heifers will finish at a weight of 1069 pounds. At any of the points between the stages of this process, the owner may sell the calf.

4.2. Budgets

The following assumptions are made for all budgets in all phases of production. The herd size is assumed to be 200 cows. Facilities are expected to have a remaining useful life of 10 years with no salvage value at the end of the remaining life. Equipment is expected to have a remaining useful life of 8 years with no salvage value at the end of the remaining life. Insurance on both facilities and equipment is 0.25% of the investment per head of each. Taxes are 1.5% of the facilities investment per head and are not paid on equipment.

4.2.1. Cow-Calf

The cow-calf budget is on a per cow basis which consists of the cow-calf pair, herd bulls, and replacement heifers not yet in production. Feedstuff prices, cattle prices, wage rate, and interest rate were taken from the year during which production (calving) occurred. All cows are assumed to have an average weight of 1200 pounds.

Weaning weights for both steers and heifers were computed for each cow-calf herd by using the following equation:

$$Calf\ weaning\ weight = 448.3 + 5.6 * ((\#\ of\ weeks\ on\ cow) - 18).$$

This equation was derived from Ciminski et al. (2002). For every cow-calf herd, the weight of the calf after 18 weeks on the cow was assumed to be 448.3 pounds. Then for every

additional week the calf remains on the cow, the calf gains 5.6 pounds. Calves are weaned at a rate of 90%.

All steer and heifer Kansas prices listed in Tables 4.2 through 4.15 were obtained from Dhuyvetter (2011a). Steer and heifers prices used in the budgets were computed by taking a weighted average of the monthly price during which the calf was purchased or sold. For example, the price of a steer to be sold on October 31st at 775 pounds is the October Steer 700-800 pound price multiplied by 75% plus the October Steer 800-900 pound price multiplied by 25%.

Cows are culled at a rate of 16% per year. Cull cows are assumed to be sold the month after weaning. Therefore, the culls from the spring herds are sold in November and the culls from the fall herds are sold in May. Cull cow Kansas prices were also obtained from Dhuyvetter (2011a) and can be found in Table 4.16.

Feed rations for the cow, bull, and replacement heifer were formulated by Dr. KC Olson and can be found in Tables 4.17 to 4.28.

Historical monthly Kansas prices for corn, milo, alfalfa hay, and other hay were obtained from Dhuyvetter (2011b). A monthly corn silage price was calculated by multiplying the corn price of the same month and year by eight. A monthly sorghum silage price was calculated by multiplying the corn silage price of the same month and year by 66.7%. These prices can be found in Tables 4.29 to 4.34.

Soybean meal prices were used for protein supplement prices as soybean meal is the most common protein supplement used according to Olson (2011). Soybean meal prices were obtained from Dhuyvetter (2011c). The prices were reported on a weekly basis. In order to

Table 4.2: Kansas Steer Prices 3-400 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	117.12	122.11	120.58	120.84	121.65	119.38	129.25	120.56	110.97	109.08	115.97	118.60
2001	124.74	117.82	128.60	125.33	126.81	128.73	116.77	120.25	119.15	113.29	114.81	120.50
2002	116.63	123.14	120.63	109.00	118.00	109.22	110.61	109.67	106.44	104.88	113.63	98.50
2003	108.01	109.38	105.27	113.19	120.10	116.90	120.32	119.01	122.99	128.51	130.71	137.00
2004	128.87	132.00	141.27	139.66	138.25	156.93	170.48	161.44	154.21	149.52	156.31	156.09
2005	150.74	146.98	163.26	171.57	165.04	162.34	159.21	158.29	158.00	158.43	171.85	164.99
2006	166.81	168.20	165.98	149.15	143.05	155.66	170.91	158.28	163.00	153.87	151.22	143.50
2007	136.13	139.98	150.91	145.18	145.18	162.10	166.88	151.94	148.06	145.64	143.39	145.00
2008	134.64	144.18	140.98	141.18	147.98	145.71	145.10	149.32	145.40	125.00	131.95	125.02
2009	129.95	131.00	129.53	136.58	138.50	137.59	127.35	127.82	121.66	125.29	120.67	127.21
2010	131.99	133.31	139.88	146.60	149.10	143.10	145.79	145.48	141.17	134.99	143.64	161.16

Source: Dhuyvetter (2011a)

Table 4.3: Kansas Steer Prices 4-500 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	107.13	108.59	110.15	113.12	108.79	111.81	114.79	105.31	100.22	99.95	107.14	106.56
2001	111.09	109.82	117.21	115.44	114.28	119.38	111.52	110.28	107.18	101.46	100.86	109.40
2002	110.43	114.71	110.57	98.73	100.50	94.78	103.17	99.09	96.89	96.19	102.39	98.29
2003	101.03	99.85	104.12	106.89	106.31	112.00	107.96	112.42	113.10	118.19	120.20	118.42
2004	114.96	116.45	124.69	124.50	127.71	134.83	148.39	141.64	135.35	136.12	136.28	132.60
2005	130.48	135.49	147.72	158.27	151.78	154.41	140.19	139.89	147.81	142.09	146.82	146.29
2006	150.68	154.76	143.16	139.32	139.99	141.18	146.77	144.35	138.81	137.36	129.03	121.34
2007	116.28	129.10	137.56	134.07	130.80	137.50	136.06	140.87	138.70	130.10	128.97	124.10
2008	123.81	135.92	135.82	133.62	134.14	134.83	137.11	131.37	133.16	118.11	118.61	115.11
2009	123.23	124.33	122.33	125.00	125.49	126.00	117.88	122.60	115.44	112.32	114.90	118.29
2010	109.85	126.17	132.95	138.60	141.15	139.25	139.13	136.20	132.11	129.01	134.48	145.44

Source: Dhuyvetter (2011a)

Table 4.4 Kansas Steer Prices 5-600 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	97.23	97.14	102.06	102.32	97.22	95.01	99.45	98.23	91.18	92.38	97.52	99.11
2001	99.77	101.21	105.94	106.80	103.67	105.51	100.50	101.75	99.65	91.79	92.58	94.25
2002	96.65	100.57	96.86	94.02	92.93	86.93	87.38	85.52	85.84	85.70	89.18	90.19
2003	90.37	87.89	91.75	96.25	97.75	96.00	98.78	104.45	111.36	107.73	107.62	110.54
2004	104.79	100.55	109.54	112.47	118.35	127.37	124.56	130.15	124.42	124.68	117.72	117.63
2005	119.94	123.09	129.48	136.24	134.39	133.13	128.89	123.46	128.74	126.15	129.43	138.06
2006	130.34	133.74	129.31	124.80	119.59	127.08	133.57	129.48	131.22	121.42	113.12	109.58
2007	107.10	118.84	126.75	127.77	123.76	129.00	131.38	127.20	127.35	120.02	118.43	114.75
2008	114.25	125.87	125.15	119.77	122.70	120.98	117.83	122.60	115.70	103.05	106.72	102.14
2009	106.98	110.17	110.99	115.31	119.02	109.50	112.97	112.40	107.97	104.32	104.22	102.41
2010	110.64	116.72	125.23	132.33	130.43	127.33	130.24	127.91	115.73	116.10	122.61	132.78

Source: Dhuyvetter (2011a)

Table 4.5: Kansas Steer Prices 6-700 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	90.64	89.77	91.46	92.68	89.86	89.74	93.26	91.38	89.50	88.27	90.51	91.73
2001	91.77	90.95	94.90	99.47	94.73	96.53	94.57	96.10	93.54	87.29	85.41	86.36
2002	86.05	87.38	87.44	83.15	86.40	80.63	82.34	82.81	82.97	80.16	82.95	85.21
2003	84.05	82.58	83.52	88.19	91.36	89.50	95.78	100.74	104.96	103.90	101.24	101.03
2004	94.49	92.81	99.02	105.13	109.45	116.68	123.90	120.59	116.81	114.83	110.00	107.41
2005	111.36	109.37	115.44	120.72	124.90	121.84	118.17	118.60	120.05	119.68	119.39	118.16
2006	120.79	119.09	113.80	111.61	112.94	119.75	123.32	119.67	121.49	112.34	102.97	102.99
2007	101.39	108.83	114.16	115.68	113.89	116.13	120.48	119.79	121.93	113.29	106.79	105.54
2008	105.73	112.05	112.28	111.31	114.83	118.50	117.51	116.35	111.68	99.34	96.86	94.70
2009	99.32	99.71	101.54	107.38	109.37	102.00	106.79	104.06	99.52	93.81	96.16	96.05
2010	100.04	106.67	114.51	122.03	118.50	117.00	119.32	119.69	113.09	111.78	111.90	120.86

Source: Dhuyvetter (2011a)

Table 4.6: Kansas Steer Prices 7-800 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	86.55	84.30	85.04	85.95	84.87	87.68	88.94	86.77	85.93	85.58	87.48	89.43
2001	88.23	86.67	87.05	89.79	90.18	93.44	91.54	90.52	90.00	88.66	85.51	82.70
2002	82.41	83.42	81.40	78.16	77.44	78.07	78.89	80.64	80.86	81.40	83.00	84.87
2003	81.54	78.48	77.73	81.51	84.32	85.93	92.17	97.75	101.61	106.22	105.47	99.95
2004	89.40	88.02	92.61	97.87	105.82	114.44	118.17	118.48	114.38	114.20	108.38	105.71
2005	104.82	102.89	107.07	113.39	113.91	114.98	111.28	113.91	115.47	118.28	115.90	115.03
2006	114.05	108.98	104.19	102.39	105.18	113.20	116.92	115.86	118.24	110.58	99.82	101.77
2007	96.61	99.76	104.89	107.82	110.70	110.56	116.37	117.61	119.18	114.20	110.60	105.12
2008	99.35	104.12	99.79	103.28	111.40	112.89	114.17	113.66	109.96	98.94	96.94	92.71
2009	95.24	93.36	92.93	98.66	102.13	96.25	103.38	101.16	98.67	92.63	93.78	94.44
2010	97.37	100.20	106.03	113.99	112.77	109.87	116.46	117.22	111.70	112.11	112.20	121.41

Source: Dhuyvetter (2011a)

Table 4.7: Kansas Steer Prices 8-900 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	83.43	80.56	79.47	81.03	80.35	85.37	87.43	84.06	81.38	82.39	84.05	87.70
2001	84.95	83.32	81.29	84.06	84.88	88.69	88.57	86.82	85.25	85.07	84.08	82.61
2002	79.38	78.97	74.90	71.45	73.02	74.66	75.55	77.67	79.84	78.79	80.90	84.94
2003	80.93	76.60	73.92	76.73	80.20	83.56	87.75	92.32	97.18	104.42	106.62	99.18
2004	85.80	83.89	87.35	93.57	102.94	113.02	114.20	115.75	112.03	112.36	108.85	104.49
2005	102.62	99.12	102.21	107.32	108.71	110.16	106.97	109.20	112.20	115.56	114.99	113.55
2006	108.68	102.72	96.00	95.35	100.36	109.16	113.41	112.12	114.05	110.27	100.09	100.68
2007	96.00	96.34	100.24	103.39	106.08	106.69	115.20	115.65	116.17	111.79	111.09	105.30
2008	96.11	99.95	94.75	98.57	107.07	109.42	112.42	111.42	109.90	95.16	96.63	91.52
2009	92.77	89.91	88.41	94.04	97.51	94.24	100.23	98.21	95.93	92.33	92.40	92.32
2010	95.82	98.01	99.64	110.02	107.54	109.23	113.84	112.41	110.71	111.68	114.58	118.67

Source: Dhuyvetter (2011a)

Table 4.8: Kansas Steer Prices 11-1300 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	68.67	68.88	71.84	73.19	71.26	69.38	67.05	65.03	65.45	68.52	72.16	76.55
2001	78.68	79.51	79.01	78.08	75.31	73.87	70.93	69.73	68.74	66.67	63.63	64.07
2002	66.93	71.36	72.33	67.00	65.69	63.79	63.35	63.15	65.38	65.52	70.35	72.72
2003	77.92	80.02	77.55	79.19	79.06	76.55	75.88	80.09	87.73	98.56	100.24	91.65
2004	80.02	79.25	85.64	85.78	87.44	88.98	84.47	83.99	83.04	85.18	86.50	87.62
2005	89.84	88.73	90.91	92.26	89.41	84.32	80.44	80.71	85.26	88.36	90.76	93.28
2006	94.73	89.76	86.21	81.85	79.10	82.66	81.39	84.81	90.68	88.87	87.26	86.28
2007	87.20	89.96	96.51	97.79	96.77	90.08	90.32	92.36	94.80	92.93	94.05	92.65
2008	92.23	91.62	89.44	89.33	93.59	95.07	98.41	98.83	98.56	91.93	90.75	84.73
2009	82.92	81.79	82.15	86.61	84.79	81.83	82.75	82.95	84.44	84.38	84.16	82.04
2010	84.93	89.67	94.48	98.46	97.88	91.97	92.78	96.55	97.25	98.41	99.41	102.59

Source: Dhuyvetter (2011a)

Table 4.9: Kansas Heifer Prices 3-400 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	103.79	106.51	106.52	110.61	114.71	106.17	114.30	107.11	95.09	99.78	103.48	103.93
2001	110.01	105.90	115.11	110.30	119.00	110.50	109.32	109.34	105.40	99.51	95.03	102.55
2002	107.01	111.00	108.49	103.48	91.50	97.58	97.26	98.44	94.00	90.94	96.31	93.06
2003	95.58	100.57	100.00	97.92	98.83	108.51	108.28	107.86	110.19	111.26	113.69	128.00
2004	108.50	107.50	121.44	118.49	125.14	141.13	172.05	145.46	137.40	133.64	130.00	131.00
2005	134.18	140.00	133.27	143.00	145.22	147.00	132.00	140.19	137.00	138.69	139.21	142.22
2006	148.75	147.04	142.82	135.00	131.88	141.95	145.10	144.30	143.58	132.25	135.25	130.00
2007	112.00	123.33	126.25	126.88	127.33	130.15	133.00	132.60	133.51	132.24	124.99	122.76
2008	120.38	126.47	122.50	115.08	126.29	128.00	124.72	123.92	129.00	110.56	113.45	103.50
2009	112.60	112.71	115.83	122.23	123.00	116.87	118.00	117.61	105.88	114.00	115.24	112.55
2010	113.23	118.21	118.08	124.41	127.92	132.04	129.98	130.44	125.03	114.72	120.79	135.18

Source: Dhuyvetter (2011a)

Table 4.10: Kansas Heifer Prices 4-500 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	96.64	96.63	99.35	100.28	99.70	99.55	103.25	96.64	89.30	92.18	97.34	96.31
2001	101.11	100.51	104.09	104.06	103.53	101.83	104.20	103.07	100.11	93.17	89.00	94.01
2002	97.56	99.40	93.86	88.82	86.87	88.50	84.43	87.04	85.99	83.40	88.87	88.65
2003	88.22	90.48	91.59	94.28	95.50	91.33	98.38	100.01	104.29	106.30	106.46	111.23
2004	105.17	104.14	110.85	113.09	117.75	127.55	129.65	136.40	128.42	124.66	118.36	122.87
2005	120.41	120.18	128.96	140.51	138.47	137.76	134.94	128.71	131.26	128.23	132.12	133.55
2006	135.93	135.52	126.10	127.41	126.81	133.50	129.09	131.96	131.45	121.24	113.87	111.24
2007	107.25	112.56	117.77	117.41	116.86	120.00	124.93	123.85	125.12	119.62	113.42	108.80
2008	109.46	117.58	114.30	110.06	124.00	122.00	125.25	117.13	110.93	102.86	102.70	94.89
2009	103.04	107.57	107.78	113.96	114.04	111.88	116.75	109.16	101.37	101.48	101.11	101.07
2010	102.63	107.51	115.53	122.69	123.78	124.98	123.32	125.71	114.77	112.92	119.30	126.81

Source: Dhuyvetter (2011a)

Table 4.11: Kansas Heifer Prices 5-600 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	89.04	88.13	91.27	91.94	89.73	91.09	92.00	89.00	86.69	86.61	89.01	88.21
2001	91.82	90.50	94.56	97.61	94.66	96.05	93.56	90.53	91.88	86.91	84.35	87.80
2002	86.30	89.52	87.01	82.59	82.14	82.25	84.75	81.02	82.63	78.55	81.60	85.20
2003	83.23	83.54	82.12	89.31	88.50	92.41	93.29	96.91	100.06	101.35	100.95	101.16
2004	97.92	95.59	102.18	105.78	108.19	118.11	119.70	124.84	119.78	113.84	112.08	110.65
2005	111.76	113.42	117.51	127.63	128.61	125.30	115.10	114.77	117.80	116.92	119.08	116.61
2006	123.61	123.29	115.44	116.11	115.23	121.00	119.50	118.82	120.03	112.12	103.45	100.29
2007	99.94	105.45	109.62	112.24	113.97	111.46	114.84	121.09	117.54	110.86	108.13	103.60
2008	99.51	110.02	106.19	104.16	116.17	115.31	117.72	114.28	107.59	95.01	94.88	87.88
2009	93.30	95.58	95.09	105.07	105.86	94.66	105.19	96.50	96.03	92.09	92.68	92.94
2010	96.67	102.18	110.47	119.12	116.87	116.31	115.97	118.68	108.46	108.95	111.63	119.82

Source: Dhuyvetter (2011a)

Table 4.12: Kansas Heifer Prices 6-700 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	84.15	83.74	83.58	85.14	83.15	87.02	87.32	84.74	83.76	85.52	86.62	87.87
2001	86.27	84.08	86.30	86.43	87.91	90.77	90.28	87.71	87.30	83.06	79.31	82.45
2002	81.10	81.76	78.46	75.18	76.15	76.80	76.89	78.56	77.47	77.30	79.07	82.52
2003	79.46	76.58	76.44	80.01	81.92	85.97	91.37	94.03	98.56	99.09	100.21	96.70
2004	89.50	87.29	92.32	94.26	103.64	107.51	116.70	117.19	113.37	110.19	106.02	101.90
2005	103.19	103.00	107.54	111.61	112.26	110.58	108.32	110.10	114.58	111.94	112.37	114.36
2006	113.45	108.63	104.34	101.87	103.66	109.94	115.62	112.83	112.78	107.89	96.67	94.63
2007	93.77	97.94	101.74	104.67	105.95	106.95	111.64	116.39	114.67	108.53	103.36	101.16
2008	95.87	100.66	97.74	100.17	107.33	105.90	108.50	110.56	105.61	91.83	91.93	85.62
2009	89.95	89.73	90.38	95.06	99.39	94.26	99.65	99.31	95.05	90.27	87.64	87.27
2010	93.37	96.34	102.64	113.12	109.68	110.22	112.99	112.04	109.26	106.70	107.83	113.80

Source: Dhuyvetter (2011a)

Table 4.13: Kansas Heifer Prices 7-800 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	80.33	79.66	79.06	79.87	79.21	82.07	84.50	82.37	79.58	81.42	83.74	84.05
2001	84.69	82.13	80.41	82.40	83.43	87.72	87.71	85.48	84.11	80.36	76.96	77.82
2002	77.85	77.11	73.86	70.73	72.43	73.39	73.56	77.47	75.64	75.84	79.93	81.56
2003	77.98	75.22	72.59	75.27	77.82	81.23	86.82	90.33	93.75	98.15	100.22	95.13
2004	86.02	82.33	85.73	89.77	100.96	107.44	111.09	111.80	108.83	107.82	106.11	100.47
2005	99.76	98.15	99.81	104.30	106.47	108.80	105.99	105.06	109.77	111.23	110.50	108.50
2006	107.92	101.35	93.49	92.76	98.30	107.08	109.81	108.89	110.39	103.22	95.43	95.95
2007	92.35	94.42	97.25	100.90	102.22	101.28	108.97	111.60	111.39	106.15	104.92	101.95
2008	92.45	96.48	92.12	94.70	103.28	104.77	108.33	110.11	106.36	90.99	91.86	85.37
2009	88.22	86.01	84.84	91.03	93.83	89.60	97.51	96.30	91.84	87.86	86.16	86.20
2010	91.91	94.08	96.52	105.87	105.46	104.54	108.73	108.08	106.56	105.52	107.27	112.18

Source: Dhuyvetter (2011a)

Table 4.14: Kansas Heifer Prices 8-900 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000					Data not available for 2000							
2001	83.35	78.11	76.78	77.06	79.00	84.88	83.84	81.69	77.32	76.66	76.01	76.65
2002	75.75	74.97	71.31	66.82	67.91	68.86	71.48	74.17	73.06	73.94	76.56	78.25
2003	78.59	73.77	70.64	72.34	75.11	77.85	82.07	87.02	89.70	95.45	95.95	92.75
2004	81.41	78.48	81.81	86.96	96.50	103.81	107.18	107.50	104.59	99.19	100.00	96.79
2005	96.72	92.73	96.20	98.94	102.69	102.92	103.54	101.19	100.96	108.24	107.33	107.46
2006	103.46	96.88	87.70	86.90	90.95	101.39	105.50	103.77	105.06	98.17	93.98	95.60
2007	91.57	93.06	94.13	96.11	99.58	96.81	105.97	108.03	107.22	102.10	102.13	97.75
2008	90.89	92.47	88.48	89.51	99.11	100.27	99.59	104.98	99.88	89.63	86.06	84.26
2009	85.79	82.51	81.53	85.75	89.77	87.70	91.80	90.62	86.56	86.31	83.14	83.12
2010	89.32	92.19	93.63	98.22	100.26	99.55	104.76	104.33	102.30	103.01	106.71	106.84

Source: Dhuyvetter (2011a)

Table 4.15: Kansas Heifer Prices 10-1200 ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	68.81	68.89	71.84	73.23	71.33	69.43	67.05	65.17	65.54	68.73	72.33	76.68
2001	78.82	79.52	78.93	77.91	75.45	74.04	71.01	69.89	68.77	66.73	63.70	64.21
2002	67.25	71.44	72.28	67.38	65.70	63.96	63.43	63.50	65.56	65.73	70.72	72.76
2003	78.08	80.14	77.54	79.13	79.04	76.48	75.97	79.96	88.18	98.93	100.29	92.76
2004	79.72	79.01	85.49	85.81	87.47	88.77	84.45	83.86	83.37	85.35	86.59	87.53
2005	89.96	89.14	90.86	92.33	89.26	84.29	80.61	80.81	85.19	88.38	90.80	93.66
2006	94.66	89.74	86.22	82.33	79.09	82.57	81.52	84.78	90.73	89.09	87.43	86.24
2007	87.17	90.11	96.58	97.63	96.75	90.19	90.35	92.39	95.05	93.33	94.11	92.52
2008	92.47	91.55	89.61	88.97	93.55	94.91	98.38	98.85	98.73	92.28	90.81	84.67
2009	83.02	81.78	82.16	86.62	84.78	81.90	82.79	82.86	84.45	84.04	84.13	81.94
2010	85.05	89.61	94.72	98.56	97.74	91.94	92.90	96.47	97.33	98.96	99.70	102.64

Source: Dhuyvetter (2011a)

Table 4.16: Kansas Cull Cow Prices ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	34.60	36.80	38.70	39.50	38.60	41.40	39.70	39.10	35.60	34.30	35.30	36.40
2001	39.40	42.10	41.90	42.20	44.00	44.40	43.30	42.90	40.70	36.80	35.20	36.20
2002	38.90	41.60	42.20	40.80	39.60	39.20	36.00	35.50	34.30	33.20	32.00	33.30
2003	37.70	39.70	39.90	40.20	42.70	43.70	45.30	45.00	45.40	44.20	45.70	48.10
2004	46.40	47.40	48.60	49.70	51.80	53.80	55.10	57.60	54.90	49.90	49.10	48.70
2005	51.30	53.80	55.30	56.30	58.10	58.00	56.50	53.00	52.50	48.00	47.00	47.20
2006	47.40	50.50	49.50	48.60	48.30	47.30	45.70	47.00	48.20	47.00	44.00	43.00
2007	45.70	47.50	48.30	49.00	51.60	50.10	53.40	54.30	51.00	48.00	44.70	46.00
2008	47.30	52.90	53.50	52.50	55.60	54.80	58.30	57.60	55.60	47.50	43.90	41.00
2009	44.00	45.70	46.30	48.20	51.50	47.40	48.80	47.60	45.40	44.00	42.70	45.60
2010	50.10	54.70	55.60	57.50	60.00	56.00	56.00	56.00	52.50	49.50	49.00	53.00

Source: Dhuyvetter (2011a)

Table 4.17: CC1 Feed Ration per Cow

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	30	.5	1.5	.25	-
February	30	.5	1.5	.25	.25
March	30	.5	1.5	.25	.25
April	30	.5	1.5	.25	.25
May	-	-	-	.25	.25
June	-	-	-	.25	.25
July	-	-	-	.25	.25
August	-	-	-	.25	.25
September	-	-	-	.25	.25
October	-	-	-	.25	.25
November	-	-	-	.25	-
December	30	.5	1.5	.25	-

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.18: CC2 Feed Ration per Cow

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	-	-	-	.25	-
February	30	.5	1.5	.25	.25
March	30	.5	1.5	.25	.25
April	30	.5	1.5	.25	.25
May	-	-	-	.25	.25
June	-	-	-	.25	.25
July	-	-	-	.25	.25
August	-	-	-	.25	.25
September	-	-	-	.25	.25
October	-	-	-	.25	.25
November	-	-	-	.25	-
December	-	-	-	.25	-

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.19: CC3 Feed Ration per Cow

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	30	1	3	.25	.25
February	30	1	3	.25	.25
March	30	1	3	.25	.25
April	30	1	3	.25	.25
May	-	-	-	.25	-
June	-	-	-	.25	-
July	-	-	-	.25	-
August	-	.5	1.5	.25	.25
September	-	.5	1.5	.25	.25
October	-	1	3	.25	.25
November	30	1	3	.25	.25
December	30	1	3	.25	.25

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.20: CC4 Feed Ration per Cow

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	30	1	3	.25	.25
February	30	1	3	.25	.25
March	30	1	3	.25	.25
April	30	1	3	.25	.25
May	-	-	-	.25	-
June	-	-	-	.25	-
July	-	-	-	.25	-
August	-	-	-	.25	.25
September	-	.5	1.5	.25	.25
October	-	.5	1.5	.25	.25
November	30	1	3	.25	.25
December	30	1	3	.25	.25

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.21: CC1 Feed Ration per Bull

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	45	1	3	.42	-
February	45	1	3	.42	.42
March	45	1	3	.42	.42
April	45	1	3	.42	.42
May	-	-	-	.42	.42
June	-	-	-	.42	.42
July	-	-	-	.42	.42
August	-	-	-	.42	.42
September	-	-	-	.42	.42
October	-	-	-	.42	.42
November	-	-	-	.42	-
December	45	1	3	.42	-

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.22: CC2 Feed Ration per Bull

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	45	1	3	.42	-
February	45	1	3	.42	.42
March	45	1	3	.42	.42
April	45	1	3	.42	.42
May	-	-	-	.42	.42
June	-	-	-	.42	.42
July	-	-	-	.42	.42
August	-	-	-	.42	.42
September	-	-	-	.42	.42
October	-	-	-	.42	.42
November	-	-	-	.42	-
December	-	-	-	.42	-

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.23: CC3 Feed Ration per Bull

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	45	1	3	.42	.42
February	45	1	3	.42	.42
March	45	1	3	.42	.42
April	45	1	3	.42	.42
May	-	-	-	.42	-
June	-	-	-	.42	-
July	-	-	-	.42	-
August	-	-	-	.42	.42
September	-	1	3	.42	.42
October	-	1	3	.42	.42
November	45	1	3	.42	.42
December	45	1	3	.42	.42

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.24: CC4 Feed Ration per Bull

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	45	1	3	.42	.42
February	45	1	3	.42	.42
March	45	1	3	.42	.42
April	45	1	3	.42	.42
May	-	-	-	.42	-
June	-	-	-	.42	-
July	-	-	-	.42	-
August	-	-	-	.42	.42
September	-	-	-	.42	.42
October	-	1	3	.42	.42
November	45	1	3	.42	.42
December	45	1	3	.42	.42

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.25: CC1 Feed Ration per Replacement Heifer

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	9	6	2	.25	-
February	9	6	2	.25	.25
March	9	6	2	.25	.25
April	9	6	2	.25	.25
May	-	-	-	.25	.25
June	-	-	-	.25	.25
July	-	-	-	.25	.25
August	-	-	-	.25	.25
September	-	-	-	.25	.25
October	-	-	-	.25	.25
November	9	6	2	.25	-
December	9	6	2	.25	-

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.26: CC2 Feed Ration per Replacement Heifer

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	9	6	2	.25	-
February	9	6	2	.25	.25
March	9	6	2	.25	.25
April	9	6	2	.25	.25
May	-	-	-	.25	.25
June	-	-	-	.25	.25
July	-	-	-	.25	.25
August	-	-	-	.25	.25
September	-	-	-	.25	.25
October	-	-	-	.25	.25
November	9	6	2	.25	-
December	9	6	2	.25	-

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.27: CC3 Feed Ration per Replacement Heifer

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	9	6	2	.25	.25
February	15	.5	1.5	.25	.25
March	15	.5	1.5	.25	.25
April	15	.5	1.5	.25	.25
May	-	-	-	.25	-
June	-	-	-	.25	-
July	-	-	-	.25	-
August	-	.5	1.5	.25	.25
September	-	.5	1.5	.25	.25
October	-	1	3	.25	.25
November	9	6	2	.25	.25
December	9	6	2	.25	.25

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.28: CC4 Feed Ration per Replacement Heifer

	Feedstuffs Consumption (pounds/head/day)				
	Brome Hay	Corn	Soybean Meal	Salt	Trace Mineral
January	9	6	2	.25	.25
February	9	6	2	.25	.25
March	15	.5	1.5	.25	.25
April	15	.5	1.5	.25	.25
May	-	-	-	.25	-
June	-	-	-	.25	-
July	-	-	-	.25	-
August	-	-	-	.25	.25
September	-	.5	1.5	.25	.25
October	-	.5	1.5	.25	.25
November	9	6	2	.25	.25
December	9	6	2	.25	.25

On pasture from May 1st to October 31st
Source: Olson (2011)

Table 4.29: Kansas Monthly Corn Prices ($/bu)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	1.81	1.95	1.97	2.02	2.08	1.89	1.74	1.67	1.90	1.96	2.07	2.09
2001	2.06	2.02	2.06	2.02	1.88	1.92	2.03	1.97	1.99	2.02	1.99	2.04
2002	2.01	1.95	1.97	1.98	1.97	2.06	2.22	2.43	2.49	2.52	2.54	2.45
2003	2.46	2.48	2.42	2.48	2.51	2.38	2.26	2.24	2.23	2.40	2.45	2.47
2004	2.63	2.81	2.93	3.04	2.97	2.94	2.67	2.37	2.18	2.37	2.29	2.01
2005	2.00	1.90	2.00	1.90	2.00	2.08	2.17	2.11	2.10	2.17	1.91	1.90
2006	1.97	2.03	2.08	2.17	2.17	2.12	2.35	2.23	2.43	2.79	3.16	3.37
2007	3.41	3.92	3.75	3.58	3.57	3.84	3.63	3.26	3.44	3.53	3.62	3.99
2008	4.37	4.86	5.08	5.47	5.66	6.48	5.98	5.37	5.02	4.93	4.53	3.72
2009	4.14	3.55	3.61	3.70	3.93	3.92	3.30	3.13	3.18	3.51	3.61	3.53
2010	3.59	3.39	3.52	3.26	3.40	3.21	3.41	3.67	4.09	4.47	4.72	5.20

Source: Dhuyvetter (2011b)

Table 4.30: Kansas Monthly Milo Prices ($/bu)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	1.56	1.66	1.73	1.74	1.83	1.56	1.38	1.44	1.48	1.64	1.79	1.95
2001	1.84	1.83	1.80	1.62	1.78	1.84	1.83	1.88	1.82	1.80	1.80	1.79
2002	1.84	1.71	1.76	1.72	1.76	1.79	2.00	2.20	2.38	2.44	2.41	2.29
2003	2.31	2.31	2.21	2.20	2.18	2.00	1.78	2.02	2.06	2.20	2.27	2.32
2004	2.43	2.61	2.64	2.80	2.62	2.49	1.93	2.01	1.78	1.66	1.69	1.59
2005	1.58	1.61	1.62	1.63	1.67	1.76	1.93	1.75	1.66	1.62	1.53	1.59
2006	1.69	1.81	1.84	1.95	2.11	2.07	2.22	2.17	2.20	3.05	3.28	3.43
2007	3.58	4.06	3.59	3.33	3.67	3.54	3.39	3.14	3.35	3.35	3.47	3.82
2008	4.23	4.74	4.96	5.22	5.28	5.82	5.71	4.68	4.65	3.80	3.74	2.87
2009	3.02	2.77	2.99	3.13	3.35	3.44	2.60	2.70	2.65	2.96	3.09	3.12
2010	3.18	2.97	3.10	2.96	3.11	2.81	3.04	3.32	4.01	4.48	4.68	5.07

Source: Dhuyvetter (2011b)

Table 4.31: Kansas Monthly Alfalfa Prices ($/ton)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	66	66	66	66	68	70	72	72	75	76	80	93
2001	93	94	96	97	92	91	89	90	99	100	100	100
2002	98	95	90	90	90	87	98	102	105	98	98	100
2003	97	90	90	90	78	74	74	84	77	77	79	73
2004	74	76	78	75	81	79	75	74	66	78	67	71
2005	69	72	79	69	76	76	74	70	74	71	71	73
2006	74	76	87	95	95	101	104	107	109	115	115	118
2007	112	124	125	120	119	113	102	107	115	112	112	113
2008	111	103	107	104	105	124	130	133	134	127	138	126
2009	132	121	122	117	120	114	112	103	103	107	107	107
2010	110	103	105	105	115	110	115	115	110	110	115	115

Source: Dhuyvetter (2011b)

Table 4.32: Kansas Monthly Other Hay Prices ($/ton)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	48	53	51	50	52	53	53	53	59	61	62	65
2001	61	63	63	64	62	60	59	60	62	65	70	65
2002	67	67	65	66	67	69	69	70	74	74	74	76
2003	76	76	70	70	65	59	59	58	58	58	56	56
2004	54	51	54	54	56	58	56	52	49	51	56	49
2005	50	52	48	51	52	52	61	57	57	50	50	52
2006	52	53	59	54	54	65	70	71	69	78	78	75
2007	80	81	84	80	84	78	88	80	77	85	80	80
2008	78	74	81	80	80	84	95	89	93	82	95	82
2009	82	78	77	74	80	82	76	76	76	72	78	74
2010	70	67	67	65	70	70	75	70	70	70	75	75

Source: Dhuyvetter (2011b)

Table 4.33: Kansas Monthly Corn Silage Prices ($/ton)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	14.48	15.60	15.76	16.16	16.64	15.12	13.92	13.36	15.20	15.68	16.56	16.72
2001	16.48	16.16	16.48	16.16	15.04	15.36	16.24	15.76	15.92	16.16	15.92	16.32
2002	16.08	15.60	15.76	15.84	15.76	16.48	17.76	19.44	19.92	20.16	20.32	19.60
2003	19.68	19.84	19.36	19.84	20.08	19.04	18.08	17.92	17.84	19.20	19.60	19.76
2004	21.04	22.48	23.44	24.32	23.76	23.52	21.36	18.96	17.44	18.96	18.32	16.08
2005	16.00	15.20	16.00	15.20	16.00	16.64	17.36	16.88	16.80	17.36	15.28	15.20
2006	15.76	16.24	16.64	17.36	17.36	16.96	18.80	17.84	19.44	22.32	25.28	26.96
2007	27.28	31.36	30.00	28.64	28.56	30.72	29.04	26.08	27.52	28.24	28.96	31.92
2008	34.96	38.88	40.64	43.76	45.28	51.84	47.84	42.96	40.16	39.44	36.24	29.76
2009	33.12	28.40	28.88	29.60	31.44	31.36	26.40	25.04	25.44	28.08	28.88	28.24
2010	28.72	27.12	28.16	26.08	27.20	25.68	27.28	29.36	32.72	35.76	37.76	41.60

Source: Dhuyvetter (2011b)

Table 4.34: Kansas Monthly Sorghum Silage Prices ($/ton)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	9.65	10.40	10.51	10.77	11.09	10.08	9.28	8.91	10.13	10.45	11.04	11.15
2001	10.99	10.77	10.99	10.77	10.03	10.24	10.83	10.51	10.61	10.77	10.61	10.88
2002	10.72	10.40	10.51	10.56	10.51	10.99	11.84	12.96	13.28	13.44	13.55	13.07
2003	13.12	13.23	12.91	13.23	13.39	12.69	12.05	11.95	11.89	12.80	13.07	13.17
2004	14.03	14.99	15.63	16.21	15.84	15.68	14.24	12.64	11.63	12.64	12.21	10.72
2005	10.67	10.13	10.67	10.13	10.67	11.09	11.57	11.25	11.20	11.57	10.19	10.13
2006	10.51	10.83	11.09	11.57	11.57	11.31	12.53	11.89	12.96	14.88	16.85	17.97
2007	18.19	20.91	20.00	19.09	19.04	20.48	19.36	17.39	18.35	18.83	19.31	21.28
2008	23.31	25.92	27.09	29.17	30.19	34.56	31.89	28.64	26.77	26.29	24.16	19.84
2009	22.08	18.93	19.25	19.73	20.96	20.91	17.60	16.69	16.96	18.72	19.25	18.83
2010	19.15	18.08	18.77	17.39	18.13	17.12	18.19	19.57	21.81	23.84	25.17	27.73

Source: Dhuyvetter (2011b)

obtain monthly prices, the weeks in each month were averaged to calculate the monthly soybean

meal price. Table 4.35 lists these prices.

Feedstuff prices were averaged for the months during which the feedstuff was fed in

order to compute the price used in the budget. For example, if corn was fed February through

April, the monthly corn prices for February, March, and April were averaged for the respective

year and then inserted in the appropriate area of the budget. A weighted average was used in the

cases in which more or less of the feedstuff was fed per day during different months. This

scenario pertains only to the cow-calf budgets as some of the rations fed fewer pounds per day

for some months than in other months.

Pasture rental rates for 2000 to 2009 for the spring cow-calf pairs were obtained from

Dhuyvetter and Tonsor (2010). The 2010 pasture rental rate for the cow-calf pairs was obtained

from Dhuyvetter (2011d). Both of these sources were based on the "Bluestem Pasture: Special

Press Release." The reports did not include pasture rental rates for fall cows placed on grass for

the summer without calves so this rate was calculated from the spring cow/calf pair pasture rate.

For the spring cow and calf, 1.25 AUMs is allotted. When the calf is removed, the spring

calving cow is allotted 1.1 AUMs. This equation was used to calculate the pasture rental rate for

the fall calving cow with no calf during a majority of the grazing season:

$$Fall\ cow\ pasture\ rental\ rate = (spring\ cow\ calf\ pair\ pasture\ rental\ rate) * \left(\frac{1.1}{1.25}\right).$$

For pasture rates for replacement heifers, the full summer season rate for steers and

heifers weighing over 700 pounds was used for the spring herds. The full summer season rate

for steers and heifers weighing 500-699 pounds was used for the fall herds' replacement heifers.

Both sets of these pasture rates were obtained from the Kansas Department of Agriculture,

Division of Statistics' "Bluestem Pasture Special Press Release" (2004) for years 2000 to 2004.

Table 4.35: Kansas City Monthly Soybean Meal Prices ($/ton)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	155.48	165.23	169.14	174.00	181.88	176.63	159.08	163.58	178.00	173.60	182.82	195.40
2001	177.20	163.48	156.88	161.33	166.77	174.13	177.60	178.64	173.50	169.44	170.25	157.03
2002	158.34	155.75	160.40	165.90	169.02	171.83	192.16	198.78	193.08	175.00	170.40	168.23
2003	172.44	180.05	182.00	182.58	200.05	195.55	201.42	190.98	221.54	222.28	253.30	230.97
2004	247.31	248.88	294.70	306.53	307.07	288.00	304.25	198.33	190.88	151.70	153.60	160.80
2005	167.98	172.23	187.14	194.30	202.27	222.02	223.35	204.22	177.85	168.40	171.52	194.10
2006	186.28	178.38	176.10	174.39	173.46	178.40	168.75	155.20	159.75	175.50	194.80	185.00
2007	194.40	217.00	215.50	197.88	201.20	226.50	220.25	218.00	253.50	263.40	289.75	320.00
2008	336.00	349.00	340.50	339.00	332.50	396.25	420.00	358.75	371.00	264.20	266.25	275.00
2009	310.00	298.00	294.75	325.00	386.00	417.50	382.80	398.75	367.00	318.25	331.50	322.00
2010	311.00	296.25	282.00	288.75	279.25	295.40	314.25	321.25	322.00	325.00	333.00	345.00

Source: Dhuyvetter (2011c)

The 2005 to 2010 pasture rental rates were obtained from Dhuyvetter (2011d) which was derived directly from the "Bluestem Pasture Special Press Release." Dhuyvetter (2011d) was used as a source for years 2005 to 2010 because data were not available through the "Bluestem Pasture Special Press Release" for 2005 as a survey was not conducted in this year or for 2010 as those numbers had not been released yet. Dhuyvetter (2011d) used regression analysis to determine the pasture rental rates for these years. All pasture rental rates are listed in Table 4.36.

There is assumed to be one bull for every 25 cows. Therefore, each cow unit is responsible for 4% of the bull feed expenses. In the budget, each feedstuff amount that is required in a bull's feed ration is multiplied by 4%.

Replacement heifers are assumed to have an average weight of 500 pounds at weaning and 800 pounds at pre-breeding. They are expected to calve at two years of age. Heifers retained as replacements for the herd are assumed to be retained at a rate of 16%. Therefore, the herd size remains constant. Since heifers are retained at a rate of 16%, each cow unit is responsible for 16% of a replacement heifer's expenses. Since heifers account for half of the calf crop and the assumed weaning rate is 90%, only 45% of the calf crop is available to be retained for replacement. Therefore, in order to maintain the cow herd size by replacing the 16% of cull cows, 35.56% of the weaned heifers must be retained for ownership.

The annual wage rate was obtained by calculating an index from the historical family living expenditures (Langemeier (2011a)) where 2009 was used as the base year. The base wage rate for 2009 was $13 per hour which was obtained from Dhuyvetter, Langemeier, and Johnson (2009). The index for each year was then multiplied by $13 to obtain the annual wage rate. Only annual wage rates could be computed so the annual wage rate is constant for all months in the same year. Annual wage rates are in Table 4.37.

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Table 4.36: Kansas Pasture Rent ($/head)

	Spring CC Pairs (6 months)	Fall Cows (6 months)	Over 700 lb Stockers (Full Season)	500-699 lb Stockers (Full Season)	500-699 lb Stockers (Short Season)
2000	106.50	93.72	75.50	63.70	54.40
2001	104.70	92.14	75.40	65.50	53.40
2002	107.80	94.86	78.30	62.80	52.90
2003	108.60	95.57	79.80	67.20	53.50
2004	109.20	96.10	75.80	66.10	54.10
2005	114.05	100.36	80.60	66.95	54.90
2006	118.90	104.63	85.40	67.80	55.70
2007	125.80	110.70	77.40	67.20	59.70
2008	133.30	117.30	89.60	73.20	61.60
2009	131.10	115.37	83.80	70.90	62.40
2010	131.27	115.52	88.14	73.11	64.28

Source: Dhuyvetter (2011d), Dhuyvetter and Tonsor (2010)

Table 4.37: Annual Kansas Wage Rate ($/hr)

Year	Wage Rate
2000	8.27
2001	8.71
2002	8.79
2003	9.35
2004	10.07
2005	10.99
2006	11.12
2007	12.13
2008	12.67
2009	13.00
2010	13.39

Source: Langemeier (2011a)

Annual hours of labor per head were computed from the Kansas Farm Management Guides (2009). This was done by taking the labor cost from each budget and dividing it by 13 (the 2009 wage rate). The results were the annual hours of labor per head which was assumed to be all unpaid labor or labor by the producer himself or herself. The annual labor hours are shown in Table 4.38.

Breeding costs are broken out into four components: capital replacement, annual bull cost, interest on breeding stock, and insurance on breeding stock. Annual bull cost is assumed constant and is taken directly from Dhuyvetter, Langemeier, and Johnson (2009).

The capital replacement value is computed as follows with a replacement rate of 16%:

$$Capital\ Replacement = Value\ of\ heifer\ calf * Replacement\ rate.$$

The value of the heifer calf is:

$$Value\ of\ heifer\ calf = Heifer\ calf\ weaning\ weight * Sale\ price.$$

In order to calculate interest and insurance on breeding stock costs, the value of breeding stock must first be calculated. The following equation is used:

$$Value\ of\ breeding\ stock$$
$$= [(\#\ of\ cows * value\ of\ breeding\ cow) + (\#\ of\ cows * heifer\ retention\ rate$$
$$* value\ of\ replacement\ heifer) + \left(\frac{\#\ of\ cows}{cows\ to\ bull\ ratio}\right)$$
$$* \left(\frac{purchase\ price\ of\ bull + salvage\ value\ of\ bull}{2}\right)]/\#\ of\ cows.$$

The cow-to-bull ratio is taken as given from Dhuyvetter, Langemeier, and Johnson (2009) to be 25 which indicates that for every 25 cows 1 bull is allotted. The purchase price of a bull is assumed to be $1800 and the salvage value is assumed to be $1250. Additionally, the following equations are used to calculate the values required in the previous equation:

Table 4.38: Annual Hours of Labor per Head (Hours/Head)

Cow-Calf Operation	Backgrounding Operation		Grass Operation		Feedlot Operation	
Cow-Unit	Steer	Heifer	Steer	Heifer	Steer	Heifer
5.9	.99	.97	.6	.6	.73	.88

Source: Kansas Farm Management Guides (2009)

$$Value\ of\ breeding\ cow = \frac{2010\ cow\ value}{2010\ replacement\ heifer\ value} * replacement\ heifer\ value,$$

and

$$Value\ of\ replacement\ heifer = \frac{2010\ replacement\ heifer\ value}{2010\ heifer\ calf\ value} * heifer\ calf\ value.$$

The 2010 cow value, 2010 replacement heifer value, and 2010 heifer calf value are from Dhuyvetter, Langemeier, and Johnson (2011). These values were used in the above equations to calculate the ratios.

Once the value of breeding stock is calculated, interest on breeding stock and insurance on breeding stock are computed as follows:

$$Interest\ on\ breeding\ stock = value\ of\ breeding\ stock * interest\ rate,$$

and

$$Insurance\ on\ breeding\ stock = value\ of\ breeding\ stock * insurance\ rate.$$

The insurance rate on breeding stock was fixed at 0.75%.

Interest rates were obtained from the Federal Reserve Bank of Kansas City (2011). The operating loan interest rate was used on an annual basis. Annual interest rates are in Table 4.39. Veterinary costs, marketing costs, utility costs, repair costs, professional fees, and miscellaneous expenses were all taken as given from Dhuyvetter, Langemeier, and Johnson (2009). Additionally, the capital investment for facilities and equipment is taken from this guide as well. The following are held constant over the 10-year period: veterinary costs, marketing costs, utility costs, repair costs, professional fees, miscellaneous costs, weaning weights, cull cow weight, culling rate, replacement rate, feed rations, salt and mineral costs, insurance rate on breeding stock, and depreciation, insurance, and taxes on facilities and equipment.

Table 4.39: Annual Interest Rate (%)

Year	Interest Rate
2000	10.46
2001	8.88
2002	7.86
2003	7.29
2004	7.35
2005	8.18
2006	9.08
2007	9.05
2008	7.40
2009	6.94
2010	6.75

Source: Federal Reserve Bank of Kansas City (2011)

Table 4.40 shows an example of the most recent year's budget for the first cow-calf scenario. The layout for the other cow-calf budgets is similar.

4.2.2. Backgrounding Budgets

Backgrounding budgets are on a per head basis in which the steers and heifers are separated. The cost of each animal is based on their weaning weight and sale price from the respective cow-calf herd they were purchased from.

The death loss cost is calculated by taking the market price of the animal which is the sale weight times the sale price and multiplying it by the death loss rate. A death loss of 1% is assumed.

Dr. KC Olson formulated backgrounding feed rations for a steer and a heifer with an initial weight of 500 pounds to gain 2.51 and 2.15 pounds per day, respectively, for 75 days. In order to adjust the feed ration to fit the initial weights of the four backgrounding scenarios, the following equation was used for each feedstuff:

$$Adjusted\ lbs\ per\ day\ of\ feedstuff$$
$$= (original\ lbs\ per\ day\ of\ feedstuff) * \frac{initial\ body\ weight}{500}.$$

This adjustment allows for the same gain per day through out all four backgrounding scenarios even though the initial weight at backgrounding varied between the scenarios. The base feed ration used with the above calculation to determine the feed ration for the steers and heifers in each backgrounding scenario can be found in Table 4.41.

A weighted average annual labor rate was computed and used for those scenarios in which the labor for that portion of production was performed in more than one year. This applies to the backgrounding scenarios B1 and B2 as the period of these phases is November through January.

Table 4.40: Cow-calf Budget Example

BUDGET FOR CC1

Returns per Cow:

Steers	255.44
Heifers	217.76
Cull Cows	81.98
Other	0.00
Gross Returns per Cow:	555.18

Costs per Cow:

Pasture	149.75
Harvested Forage	194.93
Grain	9.43
Crop Residue	0.00
Supplement	97.88
Labor	0.00
Unpaid Labor	76.70
Breeding	179.12
Depreciation on Facilites & Equipment	24.14
Interest on Facilities & Equipment	13.82
Insurance on Facilities & Equipment	0.50
Taxes on Facilities and Equipment	0.46
Vet & Drugs	16.50
Utilities, Gas, Fuel, Oil	37.00
Marketing	12.50
Repairs	35.00
Professional Fees	5.00
Miscellaneous	15.00
Subtotal:	867.73
Interest on 1/2 of Operating Costs at	22.95
Total Costs per Cow:	890.68
Return Over Total Costs:	-335.50
Return to Labor & Management:	-258.80
Return Over Feed Costs:	-68.89
Cwt. Weaned:	4.68
Average Gross Return Needed/cwt:	
To Cover Total Costs	172.80
To Cover Feed Costs	96.58
Lbs Produced per Cow:	468.00

Table 4.41: Base Feed Ration per Head for B1-B4

Daily Feedstuffs Consumption (pounds/head/day)				
Brome Hay	**Corn**	**Soybean Meal**	**Salt**	**Trace Mineral**
4	8.2	2.3	.25	.25

Source: K.C. Olson, Personal communication

A weighted average annual interest rate was computed and used for those scenarios in which a portion of the production was performed in more than one year. This applies to the backgrounding scenarios B1 and B2 as the period of these phases is November through January.

Veterinary costs, marketing costs, utility costs, repair costs, professional fees, miscellaneous expenses, and the capital investments for facilities and equipment per head were all taken as given from Dhuyvetter and Langemeier (2009a). The following are held constant over the 10-year period: days on feed, average daily gain, purchase and sale weights, death loss, feed rations, salt and mineral costs, veterinary costs, marketing costs, utility costs, repair costs, professional fees, miscellaneous costs, and depreciation, insurance, and taxes on facilities and equipment.

Table 4.42 shows an example of the most recent year's budget for the backgrounding scenario. The layout for the other backgrounding budgets is similar.

4.2.3. Grass Budgets

Grass budgets are also on a per head basis in which the steer and heifer costs are separated. The cost of each animal is based on their weight and sale price from the respective cow herd they were purchased from. Average daily gain of 2.25 and 2 pounds per day for steers and heifers, respectively, are assumed based on the early intensive grazing program the cattle are placed on.

The death loss cost is calculated by taking the market price of the animal which is the sale weight times the sale price and multiplying it by the death loss rate. A death loss of 1.5% is assumed in the grazing budgets.

Pasture rental rates for 2000 to 2009 were based on the 500-699 pound, short season stocker rates obtained from Dhuyvetter and Tonsor (2010). The 2010 pasture rental rate for the

Table 4.42: Backgrounding Budget Example

BUDGET FOR B1

	Steers	Heifers
Returns per Head:		
Market Animal	713.38	616.32
Cost of Animal	567.64	483.91
Death Loss	7.13	6.16
Other	0.00	0.00
Gross Returns per Head:	138.61	126.25
Costs per Head:		
Harvested Forage	11.99	11.10
Grain	23.77	22.00
Crop Residue	0.00	0.00
Supplement	40.43	37.48
Labor	0.00	0.00
Unpaid Labor	12.94	12.68
Depreciation on Facilites & Equipment	7.34	7.34
Interest on Facilities & Equipment	0.87	0.87
Insurance on Facilities & Equipment	0.15	0.15
Taxes on Faciliites & Equipment	0.20	0.20
Vet & Drugs	18.00	18.00
Utilities, Gas, Fuel, Oil	6.80	6.66
Marketing	8.00	8.00
Hauling	0.00	0.00
Repairs	12.00	12.00
Professional Fees	1.50	1.50
Miscellaneous	5.00	5.00
Subtotal:	148.99	142.98
Interest on feeder & 1/2 of Operating Costs	1.85	1.60
Total Costs per Head:	150.84	144.58
Return Over Total Costs:	-12.23	-18.33
Cwt produced:	1.81	1.55
Feed cost/cwt:	42.10	45.64
Total cost/cwt:	83.35	93.49
Return to Labor & Management:	0.71	-5.65
Return Over Feed Costs:	62.43	55.67
Breakeven Price ($/lb):	1.00	0.96

500-699 pound, short season stockers was obtained from Dhuyvetter (2011d). Both of these sources were based on the "Bluestem Pasture: Special Press Release." All pasture rental rates are listed in Table 4.36. Additionally, the calves' diet while on grass consisted of .25 pounds per head per day of salt and .25 pounds per head per day of mineral for both steers and heifers.

Veterinary costs, marketing costs, utility cost, repair costs, professional fees, miscellaneous expenses, and the capital investments for facilities and equipment per head for steers were all taken as given from Dhuyvetter and Langemeier (2009b). The farm management guide did not have figures for grazing heifers. Therefore, the budget numbers for heifers are assumed to be the same as for the steers. The following are held constant over the 10-year period: average daily gain, days on feed, purchase and sale weights, death loss, feed rations, salt and mineral costs, veterinary costs, marketing costs, utilities, repairs, professional fees, miscellaneous costs, and depreciation, insurance, and taxes on facilities and equipment.

Table 4.43 shows an example of the most recent year's budget for the grass scenario. The layout for the other grazing budgets is similar.

4.2.4. Feedlot Budgets

Feedlot budgets are also on a per head basis in which the steer and heifer costs are separated. For the sale price of finished cattle, a weighted average price was not used as all finished weights fell into the weight range for steer prices of 1100-1300 pounds and for heifer prices of 1000-1200 pounds. The cost of each animal is based on their beginning weight and the sale price from the respective previous phase of production they were purchased from, which is either a backgrounding or grass phase.

Days on feed and average daily gain were determined from the Seasonality of Performance of Steers and Seasonality of Performance of Heifers charts provided by Langemeier

Table 4.43: Grass Budget Example

BUDGET FOR G1

	Steers	Heifers
Returns per Head:		
Market Animal	809.20	699.53
Cost of Animal	692.79	578.55
Death Loss	12.14	10.49
Other	0.00	0.00
Gross Returns per Head:	104.27	110.49
Costs per Head:		
Summer Pasture	64.28	64.28
Supplement	9.75	9.75
Labor	0.00	0.00
Unpaid Labor	8.03	8.03
Depreciation on Facilites & Equipment	2.80	2.80
Interest on Facilities & Equipment	0.33	0.33
Insurance on Facilities & Equipment	0.06	0.06
Taxes on Facilities & Equipment	0.08	0.08
Vet & Drugs	9.00	9.00
Utilities, Gas, Fuel, Oil	6.30	6.30
Marketing	8.00	8.00
Hauling	0.00	0.00
Repairs	6.00	6.00
Professional Fees	1.00	1.00
Miscellaneous	6.00	6.00
Subtotal:	121.63	121.63
Interest on feeder & 1/2 of Operating Costs	2.13	1.81
Total Costs per Head:	123.76	123.43
Return Over Total Costs:	-19.49	-12.94
Cwt produced:	1.58	1.41
Feed cost/cwt:	46.71	52.64
Total cost/cwt:	78.08	87.77
Return to Labor & Management:	-11.45	-4.91
Return Over Feed Costs	30.24	36.46
Breakeven Price ($/lb):	1.21	1.14

(2011b) based on the closeout month of the cattle. These charts are provided in Tables 4.44 and

4.45. The feeding cost of gain for steers and heifers are also from Langemeier (2011b) which

can be found in Tables 4.46 and Table 4.47. The closeout month was used to determine the

feeding cost of gain price to use for the feeding period. The feeding cost of gain encompasses all

costs at the feedlot level such as feed, veterinarian, and death loss.

Table 4.48 shows an example of the most recent year's budget for the custom feedlot

scenario. The layout for the other custom feedlot budgets is similar.

Table 4.44: Kansas Seasonality of Performance of Steers

Closeout Month	Days on Feed	Average Daily Gain	Feed Conversion
January	148	3.43	6.21
February	151	3.29	6.28
March	159	3.16	6.29
April	165	3.05	6.18
May	165	3.15	5.99
June	159	3.38	5.82
July	153	3.49	5.85
August	152	3.53	5.90
September	143	3.59	5.90
October	145	3.62	5.91
November	140	3.65	5.98
December	143	3.63	6.03

Source: Langemeier (2011b)

Table 4.45: Kansas Seasonality of Performance of Heifers

Closeout Month	Days on Feed	Average Daily Gain	Feed Conversion
January	149	3.15	6.37
February	150	3.06	6.40
March	156	2.93	6.47
April	163	2.79	6.41
May	161	2.85	6.29
June	158	2.98	6.10
July	157	3.04	6.19
August	152	3.08	6.22
September	146	3.14	6.21
October	147	3.18	6.21
November	144	3.26	6.18
December	144	3.26	6.23

Source: Langemeier (2011b)

Table 4.46: Kansas Steer Feeding Cost of Gain at the Custom Feedlot ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	43.11	43.76	44.97	44.55	43.29	43.20	43.01	43.43	43.10	43.24	44.05	44.65
2001	46.44	46.97	50.69	52.64	50.08	48.20	48.42	48.88	48.77	47.78	49.98	49.52
2002	49.08	52.12	52.24	51.99	50.58	47.56	46.66	48.05	47.96	49.16	52.64	53.69
2003	54.99	54.79	56.94	54.08	52.60	51.85	52.16	52.53	53.31	52.69	51.10	51.68
2004	52.71	52.65	55.77	58.06	57.54	55.48	56.38	57.35	57.82	56.65	54.81	56.49
2005	58.47	56.25	56.11	55.42	53.76	51.33	50.09	50.35	51.47	50.30	52.16	51.57
2006	52.88	52.29	52.15	54.13	53.61	51.42	52.62	53.06	53.62	54.82	57.08	59.55
2007	69.03	73.54	77.64	77.61	76.64	75.36	74.22	73.91	71.73	71.68	70.00	70.73
2008	74.11	76.83	78.58	80.68	83.68	82.31	87.28	89.85	91.89	93.97	93.69	90.74
2009	89.54	86.72	83.65	84.68	81.45	78.68	76.75	76.08	72.81	73.03	71.12	71.40
2010	75.10	78.30	76.34	75.84	71.47	67.51	66.70	67.18	67.81	69.33	73.34	76.24

Source: Langemeier (2011b)

Table 4.47: Kansas Heifer Feeding Cost of Gain at the Custom Feedlot ($/cwt)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	44.36	45.51	47.08	47.03	46.54	45.48	45.52	46.34	46.45	46.49	46.32	46.78
2001	48.26	50.42	51.50	52.37	53.75	52.03	52.32	52.50	50.97	50.58	51.39	50.92
2002	51.12	53.14	55.38	53.94	53.16	51.75	51.41	51.94	52.91	52.99	56.77	55.28
2003	55.79	56.54	57.77	57.34	56.35	56.58	56.05	55.96	55.92	55.89	53.33	55.37
2004	54.11	55.72	58.55	60.01	61.39	60.03	60.79	62.47	62.78	61.70	59.52	60.07
2005	58.84	57.24	57.89	58.31	55.79	54.45	53.58	54.75	54.22	55.11	53.96	54.25
2006	54.93	54.10	53.70	57.58	55.99	55.40	57.14	56.84	58.72	58.41	60.26	62.14
2007	71.84	77.30	82.04	82.10	80.90	80.42	79.16	79.65	78.51	75.75	73.93	73.33
2008	78.26	76.99	81.20	86.44	91.65	89.49	92.89	95.08	97.35	100.38	97.02	95.06
2009	92.19	88.29	87.55	89.74	85.54	82.95	82.99	81.38	77.76	78.24	77.03	78.84
2010	79.07	78.98	78.68	78.27	75.91	71.57	72.35	73.57	72.61	74.19	76.03	79.88

Source: Langemeier (2011b)

Table 4.48: Custom Feedlot Budget Example

BUDGET FOR FC1

	Steers	Heifers
Returns per Head:		
Market Animal	1164.04	1040.84
Cost of Animal	713.38	616.32
Gross Returns per Head:	450.66	424.52
Costs per Head:		
Feeding Cost of Gain	362.81	336.98
Interest	9.14	7.80
Total Costs:	371.95	344.78
Return Over Total Costs:	78.71	79.74
Return Over Feed Costs	87.84	87.54
Breakeven Price ($/lb):	0.86	0.85

CHAPTER 5 - Analysis & Results

5.1. Net Return of Production Scenarios

Net returns for each production phase were added together for the systems in order to calculate the net return for each scenario. Additionally, the return over feed costs was calculated by subtracting total feed costs from gross returns. Gross returns are calculated by subtracting the cost of the animal and the death loss from the market price of the animal. Each of these returns was calculated on both a per head and a per cow basis. The per head basis was directly from the budget as that was the basis the backgrounding, grass, and custom feedlot budgets were figured on. However, since the cow-calf budgets were figured on a per cow basis, the returns could not be added up to reflect a systems' net return. Therefore, returns on a per cow basis were calculated as follows:

$$Return\ per\ cow = \frac{[(Steer\ return * 90) + (Heifer\ return * 58)]}{200}.$$

The 90 reflects the number of steer calves weaned while the 58 reflects the number of heifer calves weaned minus those retained as replacements. The 200 reflects the number of cows in the herd.

5.1.1. CC1-B1-FC1

CC1 is the early spring herd that calves from February 1st to March 31st. B1 and FC1 are the subsequent backgrounding and custom feedlot scenarios, respectively, for the calves from the CC1 herd to enter into after weaning.

Table 5.1 contains the net returns on a per head basis for the CC1-B1-FC1 system. The cow-calf and backgrounding phases both have negative average returns; however, the

Table 5.1: CC1-B1-FC1 Net Returns (per head)

Years	CC1	B1-Steers	B1-Heifers	FC1-Steers	FC1-Heifers
1	-291.72	16.15	-1.57	16.80	14.42
2	-294.15	-21.57	-38.08	-63.26	-61.33
3	-321.30	-2.15	-6.69	84.10	67.88
4	-233.81	-64.96	-61.03	159.62	124.91
5	-147.37	-33.59	-39.27	5.54	7.62
6	-155.20	20.82	7.70	-85.99	-84.91
7	-220.97	-97.20	-102.25	11.71	12.85
8	-307.04	-81.26	-98.66	16.87	12.93
9	-352.92	-24.35	-53.53	-96.45	-64.61
10	-335.50	-12.23	-18.33	78.71	79.74
Mean	-266.00	-30.03	-41.17	12.76	10.95
Standard Deviation	73.03	39.84	38.39	80.66	67.59
# of Negative Returns	10	8	9	3	3

CC1= Cow-calf Herd

B1= Backgrounding

FC1= Custom Feedlot

backgrounding phase does not have negative returns in all years. The custom feedlot phase has positive average returns; however, the standard deviation is relatively larger for this phase.

Table 5.2 contains the net returns on a per cow basis. All three scenarios have negative returns in all years. The cow-calf scenario has a negative average return. When the backgrounding scenario is added, the average net return becomes even more negative. When the custom feedlot scenario is added, the average net return becomes less negative than the previous stage. However, this scenario has a larger standard deviation.

Table 5.3 contains the returns over feed costs on a per head basis. All phases of production have positive average returns. However, not all returns are positive in every year. Backgrounding has the fewest number of negative returns with only two each for the steers and heifers.

Table 5.4 contains the returns over feed costs on a per cow basis. All three scenarios have positive average returns, although not all returns are positive in every year. When a phase of production is added to the scenario, the number of years with negative returns decreases. As each phase of production is added, the average return increases; however, the standard deviation also increases.

5.1.2. CC2-B2-FC2

CC2 is the late spring herd that calves from April 1st to May 30th. B2 and FC2 are the subsequent backgrounding and custom feedlot phases, respectively, for the calves weaned from the CC2 herd to enter.

Table 5.5 contains the net returns on a per head basis for the CC2-B2-FC2 system. The cow-calf and backgrounding phases both have negative average returns; however, the

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Table 5.2: CC1-B1-FC1 Net Returns (per cow)

Years	CC1	CC1-B1	CC1-B1-FC1
1	-291.72	-284.91	-273.17
2	-294.15	-314.90	-361.16
3	-321.30	-324.21	-266.68
4	-233.81	-280.74	-172.68
5	-147.37	-173.87	-169.17
6	-155.20	-143.60	-206.92
7	-220.97	-294.37	-285.37
8	-307.04	-372.22	-360.87
9	-352.92	-379.40	-441.54
10	-335.50	-346.32	-287.78
Mean	-266.00	-291.45	-282.53
Standard Deviation	73.03	77.99	87.31
# of Negative Returns	10	10	10

CC1= Cow-calf Herd

B1= Backgrounding

FC1= Custom Feedlot

Table 5.3: CC1-B1-FC1 Returns Over Feed Costs (per head)

Years	CC1	B1-Steers	B1-Heifers	FC1-Steers	FC1-Heifers
1	-3.89	87.07	68.79	27.73	23.90
2	-26.39	49.18	32.16	-54.22	-53.47
3	-67.75	68.33	63.26	92.37	75.04
4	13.32	6.33	9.71	168.82	133.03
5	102.68	38.81	32.51	17.55	18.04
6	115.45	94.39	80.63	-71.50	-72.22
7	68.02	-23.09	-28.83	23.92	23.35
8	-9.21	-6.40	-24.47	27.18	21.69
9	-80.36	50.12	20.32	-87.23	-56.89
10	-68.89	62.43	55.67	87.84	87.54
Mean	4.30	42.72	30.98	23.25	20.00
Standard Deviation	70.77	39.24	37.67	79.86	66.84
# of Negative Returns	6	2	2	3	3

CC1= Cow-calf Herd

B1= Backgrounding

FC1= Custom Feedlot

Table 5.4: CC1-B1-FC1 Returns Over Feed Costs (per cow)

Years	CC1	CC1-B1	CC1-B1-FC1
1	-3.89	55.24	74.65
2	-26.39	5.06	-34.84
3	-67.75	-18.66	44.67
4	13.32	18.99	133.54
5	102.68	129.57	142.70
6	115.45	181.30	128.19
7	68.02	49.27	66.80
8	-9.21	-19.19	-0.67
9	-80.36	-51.92	-107.67
10	-68.89	-24.65	40.26
Mean	4.30	32.50	48.76
Standard Deviation	70.77	73.77	79.80
# of Negative Returns	6	4	3

CC1= Cow-calf Herd

B1= Backgrounding

FC1= Custom Feedlot

Table 5.5: CC2-B2-FC2 Net Returns (per head)

Years	CC2	B2-Steers	B2-Heifers	FC2-Steers	FC2-Heifers
1	-230.54	16.63	5.81	13.20	7.59
2	-226.17	-23.28	-29.21	-65.31	-66.53
3	-244.58	-10.91	-2.10	79.30	60.63
4	-165.22	-59.28	-39.39	145.00	105.34
5	-93.58	-25.92	-29.48	-4.28	-3.93
6	-97.95	15.84	18.33	-91.38	-95.89
7	-149.39	-101.10	-91.04	0.90	0.98
8	-220.61	-68.17	-90.74	0.20	3.70
9	-258.34	-34.83	-50.38	-102.16	-68.86
10	-249.93	-12.01	-21.33	73.66	72.84
Mean	-193.63	-30.30	-32.95	4.91	1.59
Standard Deviation	62.39	37.14	36.98	78.70	65.41
# of Negative Returns	10	8	8	4	4

CC2= Cow-calf Herd

B2= Backgrounding

FC2= Custom Feedlot

backgrounding phase does not have negative returns in all years. The custom feedlot phase has positive average returns; however, the standard deviation is larger.

Table 5.6 contains the net returns on a per cow basis. All three scenarios have negative returns in all years. The cow-calf scenario has a negative average return. When the backgrounding scenario is added, the average net return becomes even more negative. When the custom feedlot scenario is added, the average net return becomes less negative than the previous stage. However, this scenario has a larger standard deviation.

Table 5.7 contains the returns over feed costs on a per head basis. All phases of production have positive average returns. However, not all returns are positive in every year. Table 5.8 contains the returns over feed costs on a per cow basis. All three scenarios have positive average returns. Although not all returns are positive in every year, the scenario that combines the cow-calf and backgrounding operation does have positive returns in all years. As each phase of production is added, the average return increases; however, the standard deviation also increases.

5.1.3. CC3-B3-FC3

CC3 is the early fall herd that calves from September 1st to October 31st. B3 and FC3 are the subsequent backgrounding and custom feedlot phases, respectively, for the calves weaned from the CC3 herd to enter.

Table 5.9 contains the net returns on a per head basis for the CC3-B3-FC3 system. The cow-calf, backgrounding, and custom feedlot phases all have negative average returns. However, the backgrounding and custom feedlot phases do not have negative returns in all years.

Table 5.10 contains the net returns on a per cow basis. All three scenarios have negative returns in all years and negative average returns. The cow-calf scenario has a negative average

Table 5.6: CC2-B2-FC2 Net Returns (per cow)

Years	CC2	CC2-B2	CC2-B2-FC2
1	-230.54	-221.37	-213.23
2	-226.17	-245.12	-293.80
3	-244.58	-250.10	-196.84
4	-165.22	-203.32	-107.52
5	-93.58	-113.79	-116.85
6	-97.95	-85.51	-154.43
7	-149.39	-221.29	-220.60
8	-220.61	-277.59	-276.43
9	-258.34	-288.62	-354.56
10	-249.93	-261.52	-207.25
Mean	-193.63	-216.82	-214.15
Standard Deviation	62.39	67.36	77.98
# of Negative Returns	10	10	10

CC2= Cow-calf Herd

B2= Backgrounding

FC2= Custom Feedlot

Table 5.7: CC2-B2-FC2 Returns Over Feed Costs (per head)

Years	CC2	B2-Steers	B2-Heifers	FC2-Steers	FC2-Heifers
1	45.48	87.44	76.05	23.64	16.63
2	31.03	47.39	40.93	-56.66	-59.01
3	-0.21	59.51	67.75	87.17	67.43
4	72.00	11.92	31.23	153.85	113.18
5	145.63	46.37	42.20	7.31	6.10
6	160.81	89.32	91.14	-77.42	-83.63
7	126.66	-27.08	-17.76	12.61	10.99
8	63.54	6.57	-16.70	10.14	12.00
9	3.59	39.59	23.37	-93.34	-61.56
10	6.63	62.55	52.59	82.34	80.21
Mean	65.52	42.36	39.08	14.96	10.23
Standard Deviation	60.09	36.54	36.12	77.89	64.62
# of Negative Returns	1	1	2	3	3

CC2= Cow-calf Herd

B2= Backgrounding

FC2= Custom Feedlot

Table 5.8: CC2-B2-FC2 Returns Over Feed Costs (per cow)

Years	CC2	CC2-B2	CC2-B2-FC2
1	45.48	106.88	122.34
2	31.03	64.22	21.61
3	-0.21	46.22	104.99
4	72.00	86.42	188.48
5	145.63	178.73	183.79
6	160.81	227.44	168.34
7	126.66	109.33	118.19
8	63.54	61.65	69.70
9	3.59	28.19	-31.67
10	6.63	50.03	110.34
Mean	65.52	95.91	105.61
Standard Deviation	60.09	63.15	70.37
# of Negative Returns	1	0	1

CC2= Cow-calf Herd

B2= Backgrounding

FC2= Custom Feedlot

Table 5.9: CC3-B3-FC3 Net Returns (per head)

Years	CC3	B3-Steers	B3-Heifers	FC3-Steers	FC3-Heifers
1	-305.60	-36.53	-29.01	-136.57	-114.38
2	-356.79	-52.34	-39.02	37.17	42.71
3	-342.80	15.40	16.63	184.50	176.04
4	-282.07	104.98	79.12	-81.76	-67.88
5	-157.94	-68.74	-83.95	57.06	76.87
6	-216.59	42.85	21.13	-109.62	-87.67
7	-272.97	13.81	19.92	-78.16	-44.46
8	-385.90	-6.49	13.47	-258.51	-216.65
9	-426.36	-36.25	-47.13	-113.97	-109.96
10	-343.11	-16.58	-2.14	21.20	30.76
Mean	-309.01	-3.99	-5.10	-47.87	-31.46
Standard Deviation	80.05	51.16	45.87	124.50	113.60
# of Negative Returns	10	6	5	6	6

CC3= Cow-calf Herd

B3= Backgrounding

FC3= Custom Feedlot

Table 5.10: CC3-B3-FC3 Net Returns (per cow)

Years	CC3	CC3-B3	CC3-B3-FC3
1	-305.60	-330.45	-425.08
2	-356.79	-391.66	-362.55
3	-342.80	-331.05	-196.98
4	-282.07	-211.88	-268.36
5	-157.94	-213.22	-165.25
6	-216.59	-191.18	-265.93
7	-272.97	-260.98	-309.04
8	-385.90	-384.92	-564.07
9	-426.36	-456.34	-539.52
10	-343.11	-351.19	-332.73
Mean	-309.01	-312.29	-342.95
Standard Deviation	80.05	89.27	133.46
# of Negative Returns	10	10	10

CC3= Cow-calf Herd

B3= Backgrounding

FC3= Custom Feedlot

return. When the backgrounding scenario is added, the average net return becomes even more negative. When the custom feedlot scenario is added, the average net return becomes even more negative than the previous stage. Additionally, as the phases are added, the scenario's standard deviation increases.

Table 5.11 contains the returns over feed costs on a per head basis. The cow-calf phase has a negative average return, as does the feedlot phase for both steers and heifers. The backgrounding phase has positive average returns for both steers and heifers with the steers having no negative returns in any year and the heifers having only one negative return. Table 5.12 contains the returns over feed costs on a per cow basis. The cow-calf only scenario has a negative average return. The scenario that includes cow-calf, backgrounding, and the feedlot also has a negative average return. Although this average return is not as low as the cow-calf only scenario, the standard deviation or risk is much higher. The cow-calf and backgrounding scenario has a low positive average return. As each phase of production is added, the standard deviation or risk increases.

5.1.4. CC3-G1-FC5

Again, CC3 is the early fall calving herd. Those calves weaned from the CC3 herd have the option of entering into a grazing phase (G1) instead of a backgrounding phase (B3). FC5 is the subsequent custom feedlot phase for the calves from G1 to enter.

Table 5.13 contains the net returns on a per head basis for the CC3-G1-FC5 system. The cow-calf, backgrounding, and custom feedlot phases all have negative average returns. However, the backgrounding and custom feedlot phases do not have negative returns in all years.

Table 5.14 contains the net returns on a per cow basis. All three scenarios have negative returns in all years and negative average returns. The cow-calf scenario has a negative average

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Table 5.11: CC3-B3-FC3 Returns Over Feed Costs (per head)

Years	CC3	B3-Steers	B3-Heifers	FC3-Steers	FC3-Heifers
1	-20.33	34.51	41.41	-127.66	-106.40
2	-93.50	18.15	30.88	44.00	48.78
3	-93.91	86.31	86.99	191.89	182.65
4	-41.02	176.91	150.48	-72.17	-59.36
5	83.26	4.90	-10.98	67.17	85.72
6	46.85	116.75	94.38	-97.87	-77.22
7	9.59	88.74	94.00	-66.60	-34.42
8	-93.56	68.22	87.39	-249.26	-208.61
9	-158.64	38.48	26.95	-106.11	-103.06
10	-84.29	58.67	72.37	29.79	38.34
Mean	-44.55	69.16	67.39	-38.68	-23.36
Standard Deviation	74.57	51.14	45.87	123.87	113.15
# of Negative Returns	7	0	1	6	6

CC3= Cow-calf Herd

B3= Backgrounding

FC3= Custom Feedlot

Table 5.12: CC3-B3-FC3 Returns Over Feed Costs (per cow)

Years	CC3	CC3-B3	CC3-B3-FC3
1	-20.33	7.21	-81.10
2	-93.50	-76.38	-42.43
3	-93.91	-29.85	109.47
4	-41.02	82.23	32.54
5	83.26	82.28	137.37
6	46.85	126.76	60.33
7	9.59	76.79	36.84
8	-93.56	-37.52	-210.18
9	-158.64	-133.50	-211.14
10	-84.29	-36.90	-12.38
Mean	-44.55	6.11	-18.07
Standard Deviation	74.57	83.33	120.61
# of Negative Returns	7	5	5

CC3= Cow-calf Herd

B3= Backgrounding

FC3= Custom Feedlot

Table 5.13: CC3-G1-FC5 Net Returns (per head)

Years	CC3	G1-Steers	G1-Heifers	FC5-Steers	FC5-Heifers
1	-305.60	-45.94	-44.86	-134.69	-104.27
2	-356.79	-55.37	-55.35	34.34	55.63
3	-342.80	11.78	3.63	180.39	184.91
4	-282.07	108.94	70.04	-82.54	-52.88
5	-157.94	-74.88	-102.19	52.42	88.47
6	-216.59	32.47	-3.21	-111.17	-71.47
7	-272.97	13.49	12.92	-78.25	-35.01
8	-385.90	21.27	31.59	-256.60	-205.25
9	-426.36	-21.40	-41.82	-113.75	-99.48
10	-343.11	-19.48	-12.94	20.65	41.46
Mean	-309.01	-2.91	-14.22	-48.92	-19.79
Standard Deviation	80.05	52.95	48.88	122.56	113.01
# of Negative Returns	10	5	6	6	6

CC3= Cow-calf Herd

G1= Grazing

FC5= Custom Feedlot

Table 5.14: CC3-G1-FC5 Net Returns (per cow)

Years	CC3	CC3-G1	CC3-G1-FC5
1	-305.60	-339.28	-430.13
2	-356.79	-397.76	-366.18
3	-342.80	-336.45	-201.65
4	-282.07	-212.73	-265.21
5	-157.94	-221.28	-172.03
6	-216.59	-202.91	-273.66
7	-272.97	-263.15	-308.52
8	-385.90	-367.17	-542.16
9	-426.36	-448.12	-528.15
10	-343.11	-355.63	-334.31
Mean	-309.01	-314.45	-342.20
Standard Deviation	80.05	84.65	126.23
# of Negative Returns	10	10	10

CC3= Cow-calf Herd

G1= Grazing

FC5= Custom Feedlot

return. When the backgrounding scenario is added, the average net return becomes even more negative. When the custom feedlot scenario is added, the average net return becomes even more negative than the previous stage. Additionally, as the phases are added, the scenario's standard deviation increases.

Table 5.15 contains the returns over feed costs on a per head basis. The cow-calf phase has a negative average return, as does the feedlot phase for both steers and heifers. The backgrounding phase has positive average returns for both steers and heifers with only two years of negative returns each.

Table 5.16 contains the returns over feed costs on a per cow basis. All three scenarios have negative average returns. The cow-calf only scenario has the largest negative average return and the cow-calf and backgrounding scenario has the smallest negative average return. As each phase of production is added, the standard deviation increases.

5.1.5. CC4-B4-FC4

CC4 is the late fall herd that calves from October 1st to November 30th. B4 and FC4 are the subsequent backgrounding and custom feedlot phases, respectively, for the calves weaned from the CC4 herd to enter.

Table 5.17 contains the net returns on a per head basis for the CC4-B4-FC4 system. The cow-calf, backgrounding, and custom feedlot phases all have negative average returns. However, the backgrounding and custom feedlot phases do not have negative returns in all years.

Table 5.18 contains the net returns on a per cow basis. All three scenarios have negative returns in all years and negative average returns. The cow-calf scenario has a negative average return. When the backgrounding scenario is added, the average net return becomes even more negative. When the custom feedlot scenario is added, the average net return becomes even more

Table 5.15: CC3-G1-FC5 Returns Over Feed Costs (per head)

Years	CC3	G1-Steers	G1-Heifers	FC5-Steers	FC5-Heifers
1	-20.33	1.26	2.03	-125.97	-96.53
2	-93.50	-8.69	-8.92	41.03	61.44
3	-93.91	58.71	50.34	187.63	191.31
4	-41.02	156.59	117.47	-73.13	-44.64
5	83.26	-25.93	-53.54	62.37	97.05
6	46.85	81.57	45.60	-99.62	-61.39
7	9.59	63.20	62.18	-66.94	-25.25
8	-93.56	70.63	80.56	-247.56	-197.44
9	-158.64	27.92	7.26	-106.06	-92.79
10	-84.29	30.24	36.46	29.04	48.81
Mean	-44.55	45.55	33.94	-39.92	-11.94
Standard Deviation	74.57	53.02	48.96	121.95	112.57
# of Negative Returns	7	2	2	6	6

CC3= Cow-calf Herd

G1= Grazing

FC5= Custom Feedlot

Table 5.16: CC3-G1-FC5 Returns Over Feed Costs (per cow)

Years	CC3	CC3-G1	CC3-G1-FC5
1	-20.33	-19.18	-103.86
2	-93.50	-100.00	-63.71
3	-93.91	-52.90	87.02
4	-41.02	63.51	17.66
5	83.26	56.07	112.27
6	46.85	96.78	34.15
7	9.59	56.07	18.62
8	-93.56	-38.41	-207.07
9	-158.64	-143.96	-218.60
10	-84.29	-60.11	-32.88
Mean	-44.55	-14.21	-35.64
Standard Deviation	74.57	79.33	113.47
# of Negative Returns	7	6	5

CC3= Cow-calf Herd

G1= Grazing

FC5= Custom Feedlot

Table 5.17: CC4-B4-FC4 Net Returns (per head)

Years	CC4	B4-Steers	B4-Heifers	FC4-Steers	FC4-Heifers
1	-303.56	-35.29	-25.87	-134.25	-112.51
2	-355.25	-45.92	-29.24	33.43	32.10
3	-338.17	12.70	17.05	179.12	173.06
4	-277.99	102.20	77.37	-82.93	-64.79
5	-153.71	-74.06	-78.41	50.90	70.62
6	-213.53	40.98	19.10	-111.80	-85.80
7	-275.49	19.43	23.45	-78.40	-44.13
8	-378.86	-10.67	25.45	-256.16	-224.31
9	-417.14	-34.75	-41.71	-113.79	-113.63
10	-336.58	-11.63	4.09	20.41	29.15
Mean	-305.03	-3.70	-0.87	-49.35	-34.03
Standard Deviation	78.54	50.36	43.79	122.01	112.86
# of Negative Returns	10	6	4	6	6

CC4= Cow-calf Herd

B4= Backgrounding

FC4= Custom Feedlot

Table 5.18: CC4-B4-FC4 Net Returns (per cow)

Years	CC4	CC4-B4	CC4-B4-FC4
1	-303.56	-326.94	-419.98
2	-355.25	-384.40	-360.04
3	-338.17	-327.51	-196.72
4	-277.99	-209.56	-265.67
5	-153.71	-209.78	-166.39
6	-213.53	-189.55	-264.74
7	-275.49	-259.95	-308.03
8	-378.86	-376.28	-556.60
9	-417.14	-444.87	-529.03
10	-336.58	-340.63	-322.99
Mean	-305.03	-306.95	-339.02
Standard Deviation	78.54	86.09	130.22
# of Negative Returns	10	10	10

CC4= Cow-calf Herd

B4= Backgrounding

FC4= Custom Feedlot

negative than the previous stage. Additionally, as the phases are added, the scenario's standard deviation increases.

Table 5.19 contains the returns over feed costs on a per head basis. The cow-calf phase has a negative average return, as does the feedlot phase for both steers and heifers. The backgrounding phase has positive average returns for both steers and heifers with each having only one year of negative returns.

Table 5.20 contains the returns over feed costs on a per cow basis. The cow-calf only scenario has a negative average return. The scenario that includes cow-calf, backgrounding, and the feedlot also has a negative average return. Although this average return is not as low as the cow-calf only scenario, the standard deviation is much higher. The cow-calf and backgrounding scenario has a positive average return. As each phase of production is added, the standard deviation increases.

5.1.6. CC4-G2-FC6

Again, CC4 is the late fall calving herd. Those calves weaned from the CC4 herd have the option of entering into a grazing phase (G2) instead of a backgrounding phase (B4). FC6 is the subsequent custom feedlot phase for the calves from G2 to enter.

Table 5.21 contains the net returns on a per head basis for the CC4-G2-FC6 system. The cow-calf, backgrounding, and custom feedlot phases all have negative average returns. However, the backgrounding and custom feedlot phases do not have negative returns in all years.

Table 5.22 contains the net returns on a per cow basis. All three scenarios have negative returns in all years and negative average returns. The cow-calf scenario has a negative average return. When the backgrounding scenario is added, the average net return becomes even more negative. When the custom feedlot scenario is added, the average net return becomes even more

Table 5.19: CC4-B4-FC4 Returns Over Feed Costs (per head)

Years	CC4	B4-Steers	B4-Heifers	FC4-Steers	FC4-Heifers
1	-19.50	35.69	44.48	-125.59	-104.78
2	-92.46	24.51	40.62	40.09	38.08
3	-89.37	83.57	87.35	186.32	179.45
4	-36.76	174.09	148.67	-73.57	-56.55
5	87.74	-0.45	-5.51	60.80	79.25
6	49.70	114.83	92.27	-100.31	-75.68
7	6.45	94.26	97.44	-67.16	-34.41
8	-87.29	63.99	99.29	-247.18	-216.42
9	-149.56	39.93	32.31	-106.15	-106.91
10	-77.41	63.54	78.52	28.74	36.48
Mean	-40.85	69.39	71.54	-40.40	-26.15
Standard Deviation	72.86	50.34	43.82	121.40	112.44
# of Negative Returns	7	1	1	6	6

CC4= Cow-calf Herd

B4= Backgrounding

FC4= Custom Feedlot

Table 5.20: CC4-B4-FC4 Returns Over Feed Costs (per cow)

Years	CC4	CC4-B4	CC4-B4-FC4
1	-19.50	9.46	-77.44
2	-92.46	-69.65	-40.57
3	-89.37	-26.43	109.45
4	-36.76	84.70	35.19
5	87.74	85.94	136.28
6	49.70	128.13	61.05
7	6.45	77.13	36.92
8	-87.29	-29.70	-203.69
9	-149.56	-122.23	-201.00
10	-77.41	-26.04	-2.53
Mean	-40.85	11.13	-14.63
Standard Deviation	72.86	80.16	117.51
# of Negative Returns	7	5	5

CC4= Cow-calf Herd

B4= Backgrounding

FC4= Custom Feedlot

Table 5.21: CC4-G2-FC6 Net Returns (per head)

Years	CC4	G2-Steers	G2-Heifers	FC6-Steers	FC6-Heifers
1	-303.56	-47.11	-35.02	-132.07	-111.49
2	-355.25	-51.55	-31.09	30.94	27.77
3	-338.17	6.34	11.51	175.37	171.83
4	-277.99	102.67	78.46	-83.14	-63.23
5	-153.71	-83.19	-85.33	46.93	68.19
6	-213.53	27.76	7.24	-112.72	-84.74
7	-275.49	15.71	22.30	-78.10	-43.81
8	-378.86	12.27	52.96	-253.92	-227.23
9	-417.14	-24.02	-28.71	-113.24	-114.97
10	-336.58	-17.98	1.10	20.14	28.59
Mean	-305.03	-5.91	-0.66	-49.98	-34.91
Standard Deviation	78.54	51.74	47.07	120.09	112.52
# of Negative Returns	10	5	4	6	6

CC4= Cow-calf Herd

G2= Grazing

FC6= Custom Feedlot

Table 5.22: CC4-G2-FC6 Net Returns (per cow)

Years	CC4	CC4-G2	CC4-G2-FC6
1	-303.56	-334.91	-426.68
2	-355.25	-387.47	-365.49
3	-338.17	-331.98	-203.23
4	-277.99	-209.03	-264.78
5	-153.71	-215.89	-175.00
6	-213.53	-198.93	-274.23
7	-275.49	-261.96	-309.81
8	-378.86	-357.98	-538.14
9	-417.14	-436.28	-520.58
10	-336.58	-344.35	-326.99
Mean	-305.03	-307.88	-340.49
Standard Deviation	78.54	81.77	123.39
# of Negative Returns	10	10	10

CC4= Cow-calf Herd

G2= Grazing

FC6= Custom Feedlot

negative than the previous stage. Additionally, as the phases are added, the scenario's standard deviation increases.

Table 5.23 contains the returns over feed costs on a per head basis. The cow-calf phase has a negative average return, as does the feedlot phase for both steers and heifers. The backgrounding phase has positive average returns for both steers and heifers with steers having two years of negative returns and heifers having only one year of negative returns.

Table 5.24 contains the returns over feed costs on a per cow basis. All three scenarios have negative average returns. The cow-calf only scenario has the largest negative average return and the cow-calf and backgrounding scenario has the smallest negative average return. As each phase of production is added, the standard deviation increases.

5.2. Correlations

Correlation coefficient matrices were calculated for each system on both a net return per head and a net return per cow basis. Tables 5.25 through 5.36 contain the correlation matrices for each system's net returns on a per head basis and a per cow basis, respectively.

In Table 5.25, under the first column, CC1 is relatively unrelated to the backgrounding of both steers and heifers. CC1 is slightly negatively correlated to the feedlot scenario for both steers and heifers suggesting that if a producer is not making money in the cow-calf phase, he or she may be able to turn a profit in the feedlot phase, or vice versa. Backgrounding of steers and heifers are highly positively correlated as well as the steers and heifers in the feedlot which would be assumed as these are herd mates. Backgrounded steers are more negatively correlated to both the steers and heifers in the feedlot when compared to the backgrounded heifers. This suggests that a producer is more likely to be able to assume that if he or she will make a profit on backgrounding steers then he or she will not make a profit on steers and heifers in the feedlot or

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Table 5.23: CC4-G2-FC6 Returns Over Feed Costs (per head)

Years	CC4	G2-Steers	G2-Heifers	FC6-Steers	FC6-Heifers
1	-19.50	0.02	11.81	-123.60	-103.87
2	-92.46	-4.93	15.29	37.46	33.70
3	-89.37	53.24	58.16	182.40	178.11
4	-36.76	150.28	125.82	-73.97	-55.11
5	87.74	-34.26	-36.75	56.66	76.72
6	49.70	76.81	55.98	-101.45	-74.77
7	6.45	65.32	71.47	-67.11	-34.23
8	-87.29	61.59	101.87	-245.15	-219.41
9	-149.56	25.25	20.32	-105.77	-108.33
10	-77.41	31.68	50.42	28.27	35.80
Mean	-40.85	42.50	47.44	-41.23	-27.14
Standard Deviation	72.86	51.81	47.15	119.50	112.12
# of Negative Returns	7	2	1	6	6

CC4= Cow-calf Herd

G2= Grazing

FC6= Custom Feedlot

Table 5.24: CC4-G2-FC6 Returns Over Feed Costs (per cow)

Years	CC4	CC4-G2	CC4-G2-FC6
1	-19.50	-16.07	-101.81
2	-92.46	-90.24	-63.62
3	-89.37	-48.55	85.19
4	-36.76	67.36	18.09
5	87.74	61.66	109.41
6	49.70	100.50	33.17
7	6.45	56.58	16.45
8	-87.29	-30.03	-203.98
9	-149.56	-132.31	-211.32
10	-77.41	-48.53	-25.43
Mean	-40.85	-7.96	-34.39
Standard Deviation	72.86	76.40	110.77
# of Negative Returns	7	6	5

CC4= Cow-calf Herd

G2= Grazing

FC6= Custom Feedlot

Table 5.25: CC1-B1-FC1 Net Returns (per head) Correlation Matrix

	CC1	B1-Steers	B1-Heifers	FC1-Steers	FC1-Heifers
CC1	1.0000				
B1-Steers	-0.0585	1.0000			
B1-Heifers	0.0430	0.9715	1.0000		
FC1-Steers	-0.0809	-0.2828	-0.0964	1.0000	
FC1-Heifers	-0.1522	-0.2946	-0.1200	0.9904	1.0000

Table 5.26: CC1-B1-FC1 Net Returns (per cow) Correlation Matrix

	CC1	CC1-B1	CC1-B1-FC1
CC1	1.0000		
CC1-B1	0.9290	1.0000	
CC1-B1-FC1	0.7621	0.7780	1.0000

Table 5.27: CC2-B2-FC2 Net Returns (per head) Correlation Matrix

	CC2	B2-Steers	B2-Heifers	FC2-Steers	FC2-Heifers
CC2	1.0000				
B2-Steers	-0.0847	1.0000			
B2-Heifers	0.0679	0.9388	1.0000		
FC2-Steers	-0.1121	-0.1901	-0.0133	1.0000	
FC2-Heifers	-0.2037	-0.2285	-0.0881	0.9849	1.0000

Table 5.28: CC2-B2-FC2 Net Returns (per cow) Correlation Matrix

	CC2	CC2-B2	CC2-B2-FC2
CC2	1.0000		
CC2-B2	0.9160	1.0000	
CC2-B2-FC2	0.6907	0.7311	1.0000

Table 5.29: CC3-B3-FC3 Net Returns (per head) Correlation Matrix

	CC3	B3-Steers	B3-Heifers	FC3-Steers	FC3-Heifers
CC3	1.0000				
B3-Steers	0.1106	1.0000			
B3-Heifers	-0.0638	0.9502	1.0000		
FC3-Steers	0.1953	-0.1544	-0.1974	1.0000	
FC3-Heifers	0.2470	-0.1625	-0.2002	0.9965	1.0000

Table 5.30: CC3-B3-FC3 Net Returns (per cow) Correlation Matrix

	CC3	CC3-B3	CC3-B3-FC3
CC3	1.0000		
CC3-B3	0.9158	1.0000	
CC3-B3-FC3	0.7555	0.7503	1.0000

Table 5.31: CC3-G1-FC5 Net Returns (per head) Correlation Matrix

	CC3	G1-Steers	G1-Heifers	FC5-Steers	FC5-Heifers
CC3	1.0000				
G1-Steers	-0.0330	1.0000			
G1-Heifers	-0.2298	0.9412	1.0000		
FC5-Steers	0.1900	-0.2744	-0.3258	1.0000	
FC5-Heifers	0.2561	-0.2769	-0.3292	0.9960	1.0000

Table 5.32: CC3-G1-FC5 Net Returns (per cow) Correlation Matrix

	CC3	CC3-G1	CC3-G1-FC5
CC3	1.0000		
CC3-G1	0.8979	1.0000	
CC3-G1-FC5	0.7516	0.7198	1.0000

Table 5.33: CC4-B4-FC4 Net Returns (per head) Correlation Matrix

	CC4	B4-Steers	B4-Heifers	FC4-Steers	FC4-Heifers
CC4	1.0000				
B4-Steers	0.0776	1.0000			
B4-Heifers	-0.1227	0.9333	1.0000		
FC4-Steers	0.1870	-0.1492	-0.2277	1.0000	
FC4-Heifers	0.2588	-0.1327	-0.2124	0.9957	1.0000

Table 5.34: CC4-B4-FC4 Net Returns (per cow) Correlation Matrix

	CC4	CC4-B4	CC4-B4-FC4
CC4	1.0000		
CC4-B4	0.9146	1.0000	
CC4-B4-FC4	0.7486	0.7450	1.0000

Table 5.35: CC4-G2-FC6 Net Returns (per head) Correlation Matrix

	CC4	G2-Steers	G2-Heifers	FC6-Steers	FC6-Heifers
CC4	1.0000				
G2-Steers	-0.0586	1.0000			
G2-Heifers	-0.2725	0.9266	1.0000		
FC6-Steers	0.1824	-0.2641	-0.3520	1.0000	
FC6-Heifers	0.2649	-0.2461	-0.3416	0.9948	1.0000

Table 5.36: CC4-G2-FC6 Net Returns (per cow) Correlation Matrix

	CC4	CC4-G2	CC4-G2-FC6
CC4	1.0000		
CC4-G2	0.8982	1.0000	
CC4-G2-FC6	0.7452	0.7145	1.0000

vice versa compared to this same assumption with respect to backgrounding heifers. All other correlation matrices on a per head basis have a very similar interpretation.

In Table 5.26, all correlations are relatively positively strong relationships. The strongest relationship is between the cow-calf and cow-calf, backgrounding scenarios suggesting that if a positive net return is earned in one of the scenarios, it is very likely that a positive net return will be earned in the other scenario as well and vice versa. When the cow-calf, backgrounding, and custom feedlot scenario is compared to the other two scenarios, a strong positive relationship is found. This suggests that if a positive net return is earned in either the cow-calf or backgrounding scenario, a positive net return will be earned in the custom feedlot scenario and vice versa. All of these interpretations make intuitive sense as the scenarios are simply building on each other. All other correlation matrices on a per cow basis have a very similar interpretation.

5.3. Risk Analysis

Target MOTAD was used to conduct risk analysis on both the net return and return to feed costs results. It should be noted that the return over feed costs results included in this study suggest different solutions than the results from the net returns. The net return results should be the basis for long run decisions as it includes all costs and is representative of what actually occurs in production. Return over feed costs results should be analyzed for those decisions made in the short run as feed costs are the costs that are most flexible in the short run. Since most of the other costs are fixed and harder to change in the short run, the return over feed costs would be a good proxy for short run decisions.

5.3.1. Net Returns

The target used for each system was determined based on the average net return of the cow-calf herd in each scenario. The average net return of the cow-calf herd was rounded up or down to the nearest five dollars for ease of explanation.

Table 5.37 displays the results of the Target MOTAD analysis. In each situation, the cow-calf only scenario was selected as the optimal production decision. Figure 5.1 demonstrates the Target MOTAD frontiers for each system. The CC2-B2-FC2 point on the graph, which represents the optimal solution for this system, has the lowest risk and the highest return (lowest negative return) so CC2 would be the optimal cow-calf herd to choose. CC2 is the spring herd that calves from April 1st to May 31st. The optimal solutions for the CC3-B3-FC3 and CC3-G1-FC5 systems (both early fall calving herds) share the same point on the graph because they have the same cow herd which was the only scenario selected. This is also true for the CC4-B4-FC4 and CC4-G2-FC6 systems (both late fall calving herds). The optimal solution for the CC1-B1-FC1 system (early spring calving herd) is the situation with the highest risk. CC3-B3-FC3 and CC3-G1-FC5 are the systems that have the optimal solutions with the lowest return (highest negative return).

In addition to computing optimal strategies, the Target MOTAD model was used in each scenario to force the choices of retaining all calves through the backgrounding phase and retaining all calves through the finishing phase. The results for each scenario were plotted together to show the differences in net return and risk for the optimum choices of selling all calves after weaning, retaining all calves through backgrounding, and retaining all calves through finishing. These graphs can be found in Figures 5.2 though 5.7. After looking at these figures, it is evident why the cow-calf only solution was selected in all scenarios.

Table 5.37: Net Return Target MOTAD Results

System	Expected Income	Risk	Target	Optimal Choice CC	CC-B/G	CC-B/G-FC
CC1-B1-FC1	-266.00	312.63	-265.00	1.00	0.00	0.00
CC2-B2-FC2	-193.63	260.16	-195.00	1.00	0.00	0.00
CC3-B3-FC3	-309.01	304.96	-310.00	1.00	0.00	0.00
CC3-G1-FC5	-309.01	304.96	-310.00	1.00	0.00	0.00
CC4-B4-FC4	-305.03	301.00	-305.00	1.00	0.00	0.00
CC4-G2-FC6	-305.03	301.00	-305.00	1.00	0.00	0.00

Figure 5.1: Net Return Target MOTAD Risk-Income Frontier
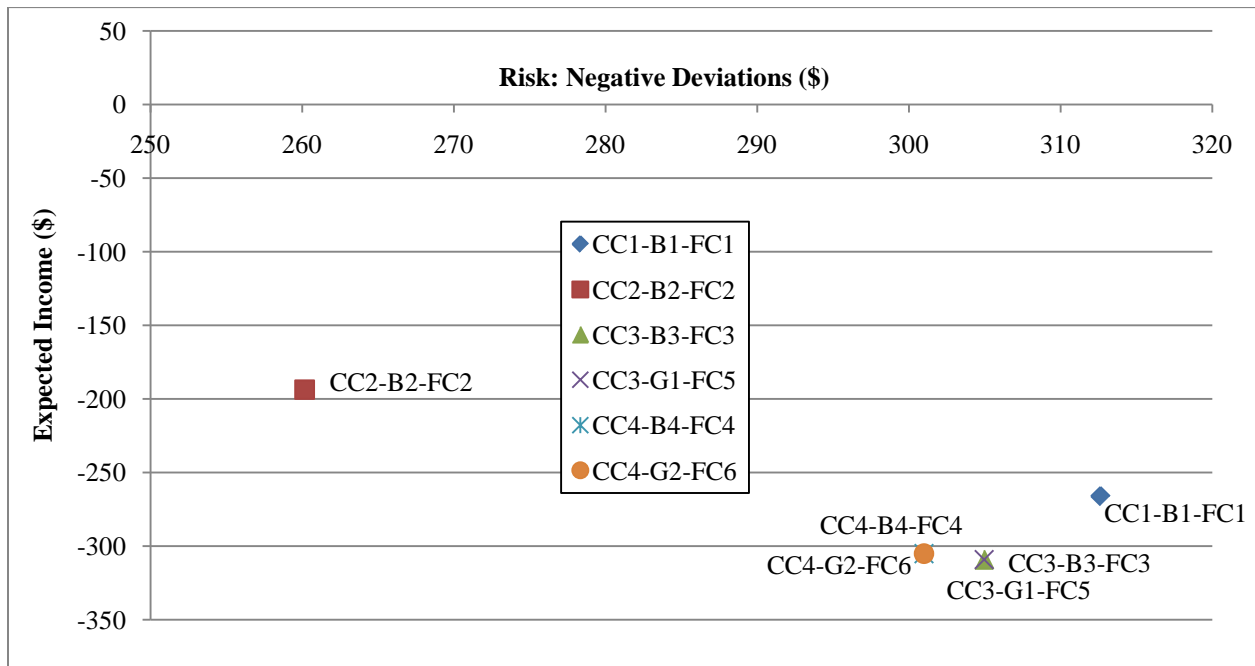
Figure 5.2: CC1-B1-FC1 Net Return Target MOTAD Risk-Income Frontier
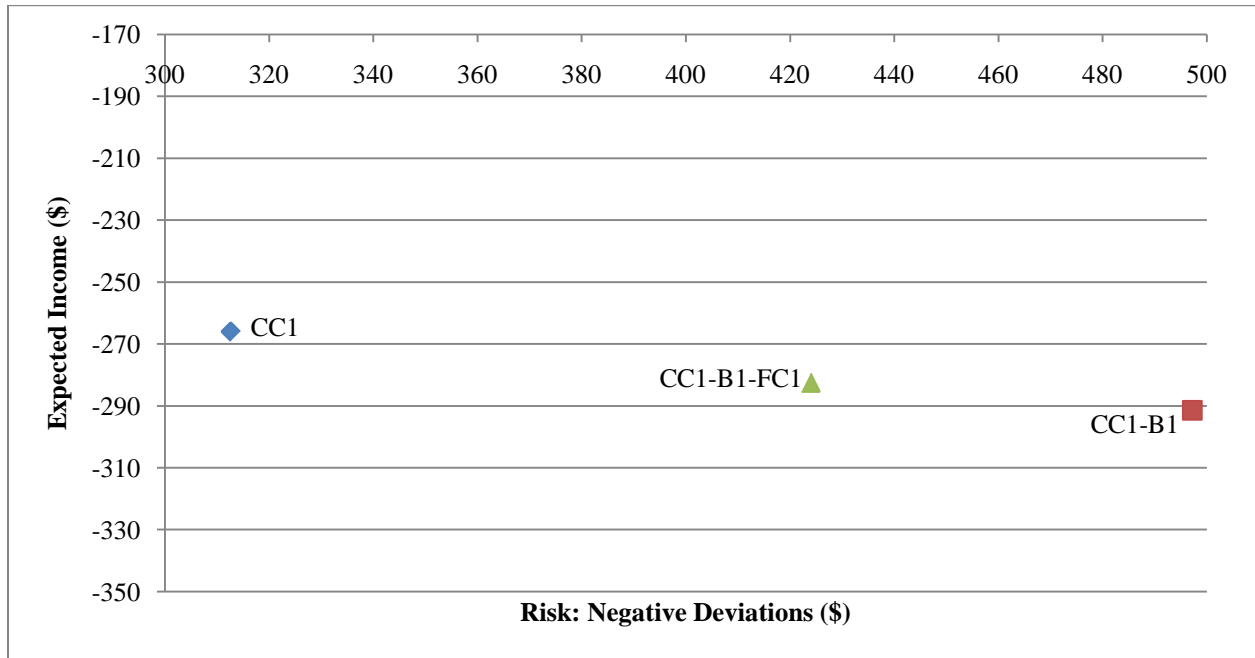
Figure 5.3: CC2-B2-FC2 Net Return Target MOTAD Risk-Income Frontier
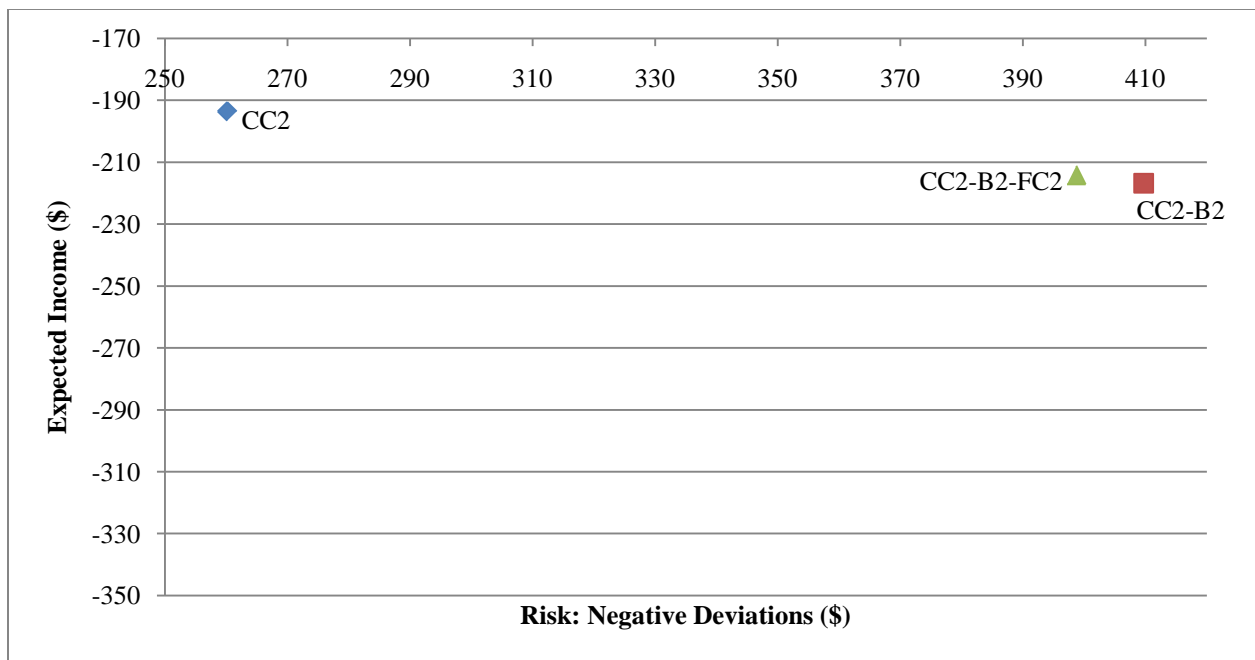
Figure 5.4: CC3-B3-FC3 Net Return Target MOTAD Risk-Income Frontier
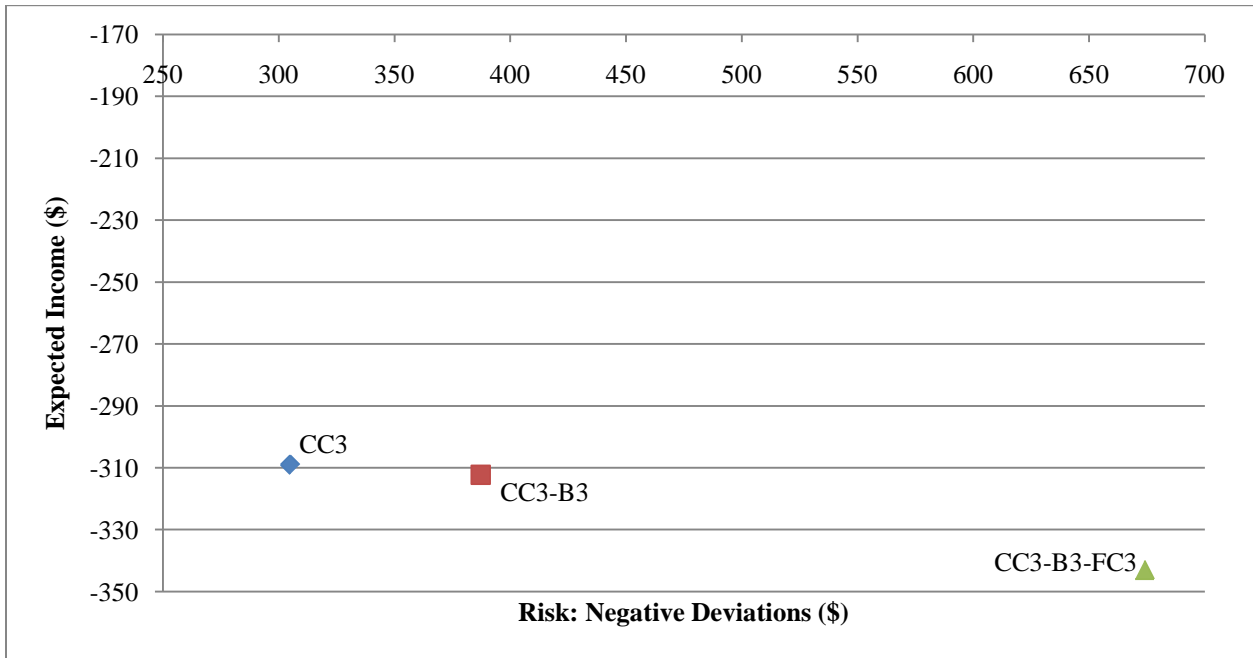
Figure 5.5: CC3-G1-FC5 Net Return Target MOTAD Risk-Income Frontier
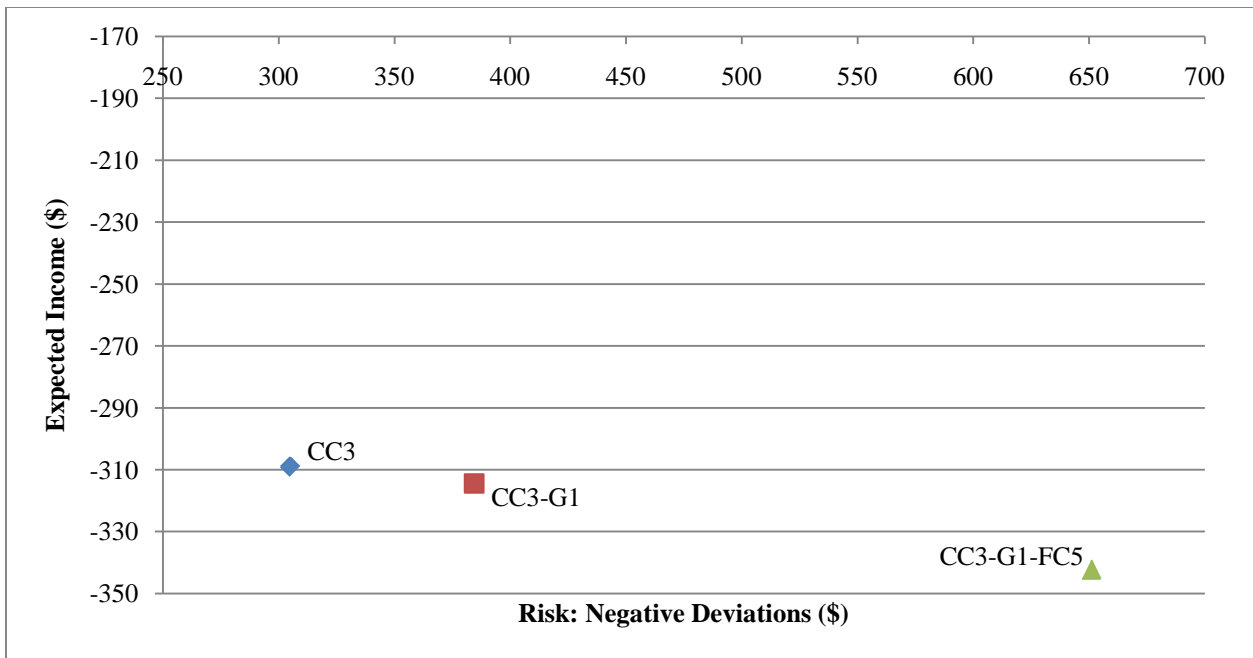
Figure 5.6: CC4-B4-FC4 Net Return Target MOTAD Risk-Income Frontier
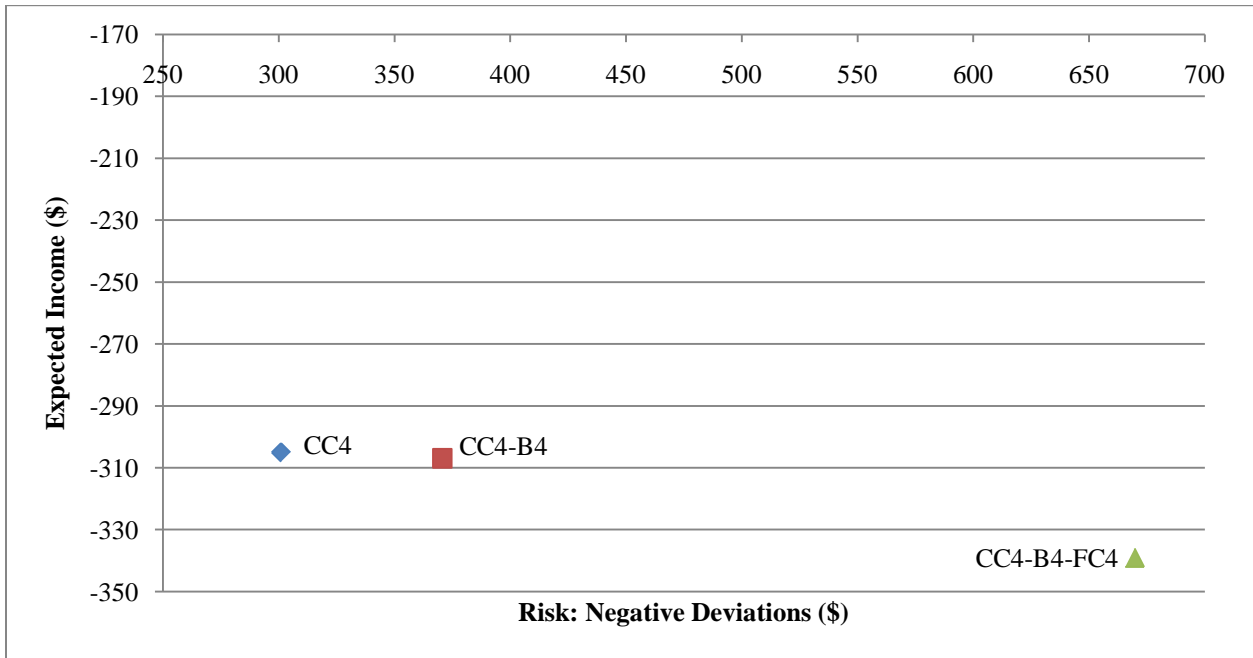
Figure 5.7: CC4-G2-FC6 Net Return Target MOTAD Risk-Income Frontier
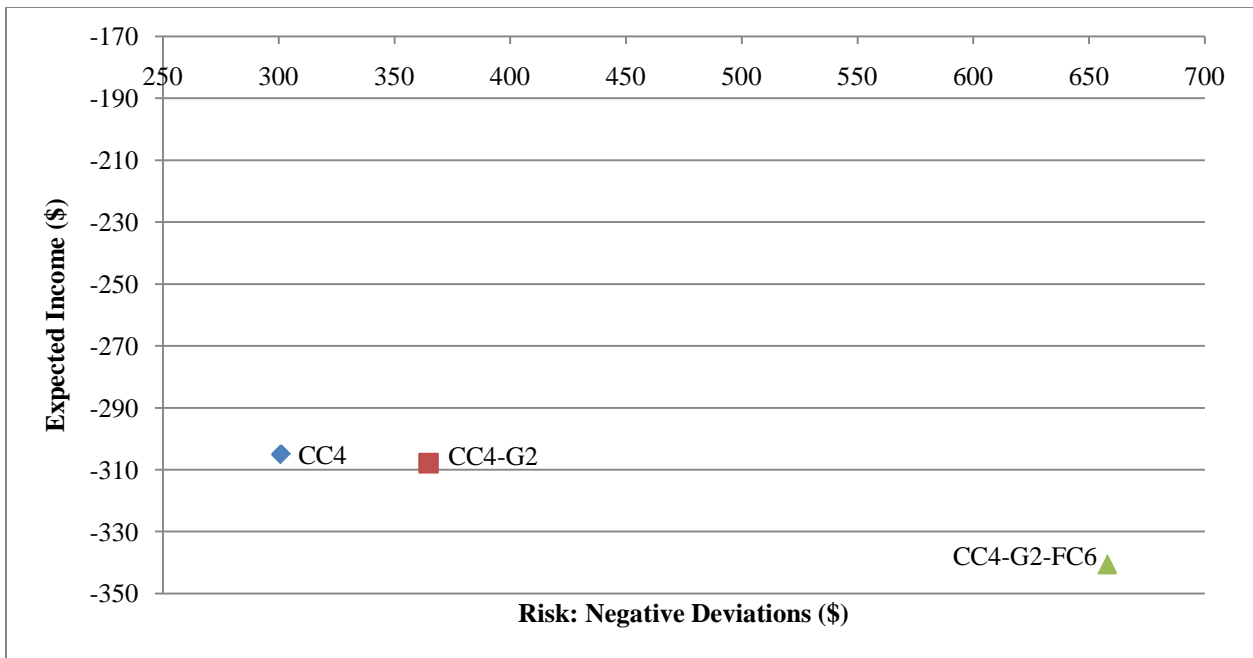
Figure 5.2 demonstrates that CC1 (early spring calving), selling calves after weaning, has both a much higher or less negative net return and much lower negative deviation level. Interestingly, CC1-B1-FC1, retaining calves through the finishing phase, would be a better choice than CC1-B1, retaining calves through the backgrounding phase, as the former has a higher net return and a lower risk level.

Figure 5.3, which illustrates the CC2 (late spring calving) scenarios, illustrates a similar difference in net return and risk level between retaining calves through finishing versus backgrounding. However, it is still very evident that the cow-calf only solution is a much better choice.

Figure 5.4 is different from the previous two scenarios in that retaining calves through backgrounding is a better decision than retaining calves through finishing. In fact, retaining calves through finishing is a drastically worse decision as the net return is much lower and the risk level is much higher. The decision to retain calves through backgrounding has a slightly lower net return and slightly higher risk level compared to the cow-calf only decision. Figures 5.5 through 5.7 show similar results to Figure 5.4 as all of these scenarios are based on fall calving herds. The main difference is that Figures 5.5 and 5.7 use a grazing phase of production instead of a backgrounding phase of production.

5.3.2. Returns Over Feed Costs

The target used for each system was determined based on the average return over feed costs of the cow-calf herd in each scenario. The average return over feed costs of the cow-calf herd was rounded up or down to the nearest five dollars for ease of explanation. Table 5.38 displays the results of the Target MOTAD analysis for return over feed costs on a per cow basis.

Table 5.38: Returns Over Feed Costs Target MOTAD Results

	Expected Income	Risk	Target	Optimal Choice		
				CC	CC-B/G	CC-B/G-FC
CC1-B1-FC1	48.76	158.18	5.00	0.00	0.00	1.00
	47.04	150.00	5.00	0.00	0.11	0.89
	41.77	125.00	5.00	0.00	0.43	0.57
	40.72	120.00	5.00	0.00	0.49	0.51
	38.58	115.26	5.00	0.00	0.63	0.37
CC2-B2-FC2	105.61	140.06	65.00	0.00	0.00	1.00
	104.19	125.00	65.00	0.00	0.15	0.85
	101.82	100.00	65.00	0.00	0.39	0.61
	99.41	75.00	65.00	0.00	0.64	0.36
CC3-B3-FC3	6.11	119.88	-45.00	0.00	1.00	0.00
CC3-G1-FC5	-14.21	176.96	-45.00	0.00	1.00	0.00
	-14.54	175.00	-45.00	0.00	0.98	0.02
CC4-B4-FC4	11.13	111.88	-40.00	0.00	1.00	0.00
CC4-G2-FC6	-7.96	159.64	-40.00	0.00	1.00	0.00

For the CC1-B1-FC1 scenario (early spring calving herd), five optimal choices are possible. The choice with the highest return over feed costs also has the highest deviation level. This option's optimal choice is to retain all calves through the finishing phase. The other choices in this scenario have a lower return over feed costs, a lower risk level, and retain fewer of the calves all the way through finishing. The option with the lowest risk but also lowest return over feed costs suggests retaining 63% of calves through the backgrounding phase and the remaining 37% all the way through the finishing phase of production each year.

For the CC2-B2-FC2 scenario (late spring calving herd), four optimal choices are possible. The choice with the highest return over feed costs also has the highest negative deviation level. This option's optimal decision is to retain all calves through the finishing phase. Similarly, the other choices in this scenario have a lower return over feed costs, a lower risk level, and retain fewer calves all the way through finishing. The option with the lowest risk but also the lowest return over feed costs has a optimal decision of retaining 64% of calves through backgrounding and 36% through finishing each year.

The CC3-B3-FC3 scenario (early fall calving herd, backgrounding option) only has one optimal choice which is to retain all calves through the backgrounding phase of production. This is also true for the CC4-B4-FC4 (late fall calving herd, backgrounding option) and the CC4-G2-FC6 (late fall calving herd, grazing option) scenarios.

For the CC3-G1-FC5 scenario (early fall calving herd, grazing option), two optimal decisions are plausible. The first optimal choice is to retain all calves through the backgrounding phase. It has the lowest negative return over feed costs and the highest negative deviation level. The second optimal decision is to retain 98% of calves through backgrounding and 2% through finishing. It has a slightly more negative return over feed costs but a smaller risk level.

Figure 5.8 displays the Target MOTAD frontiers for each situation. The CC2-B2-FC2 (late spring calving herd) frontier has the best combination of highest return over feed costs and lowest risk on the graph. Therefore, this would be the optimal scenario to choose. The point on this frontier that is selected is dependent on the producer's desired level of risk. The CC3-G1-FC5 (early fall calving herd, grazing option) scenario has the lowest return over feed costs and highest risk.

Figure 5.8: Return Over Feed Costs Target MOTAD Risk-Income Frontier
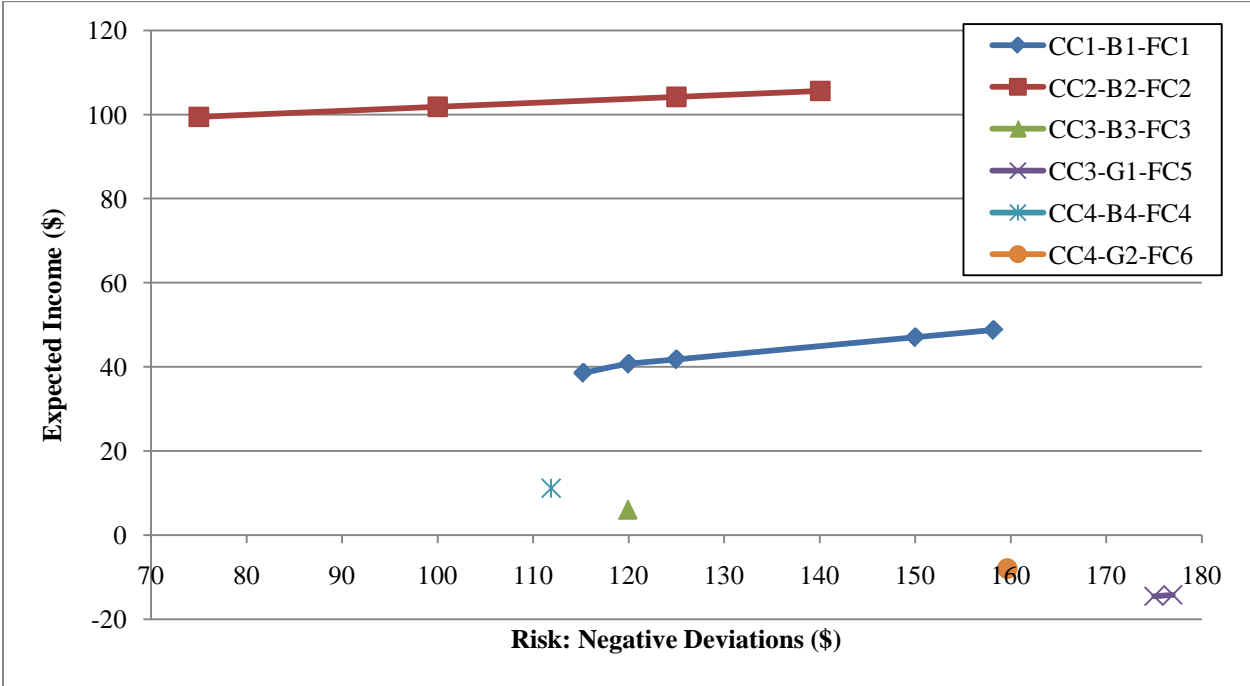
CHAPTER 6 - Conclusions

6.1. Summary

Retained ownership is not easily defined but can generally be described as when a producer does not sell his or her calf crop immediately after weaning but keeps the calves for an extended period of time. The length of time the calves are retained varies between producers and from year to year for the same producer. For some, the decision is based on past practices while others will evaluate the market before making a decision. There are various levels of retained ownership that can be modified to fit a producer's operation and can range from a preconditioning program to finishing the cattle in the feedlot. In order to be able to analyze the retained ownership decision, this study had to simplify and specify retained ownership scenarios.

Budgets were developed for scenarios of four cow-calf herds, four backgrounding phases, two grazing phases, and six custom feedlot phases. These budgets were used to produce 16 potential retained ownership scenarios. The scenarios range from selling the calves immediately after weaning to owning the cattle through finishing at the feedlot. Each scenario was then analyzed based on the net returns per head and per cow over a 10-year period. Additionally, the scenarios were analyzed based on net returns over feed costs per head and per cow. Target MOTAD was used to analyze the risk component of the scenarios.

Results consistently showed negative net returns on a per cow basis for all scenarios in all systems. Additionally, Target MOTAD consistently selected the cow-calf only scenario as the optimum solution for cow-calf producers to choose. Retaining ownership beyond this point tended to increase risk and decrease average returns. Therefore, based on net returns per cow, the optimum decision is to sell calves immediately after weaning the calf from the cow. When comparing the cow-calf options, the CC2 cow-calf herd, or late spring calving herd, appears to

be the optimum solution as it has the solution with a combination of the lowest negative average return and lowest risk associated with it.

6.2. Research Limitations

Since each operation does things a little differently, this research may not be applicable to all producers. This research is limited in that it is very specific in many of the criteria that are used, such as the cattle weights, feed rations, average daily gain, days on feed, and other variables, that when changed can have a large impact on profitability. Ideally, this research would be able to be altered to fit each producer's operation and therefore give a better analysis to individuals.

This research does not distinguish between those producers in the top, middle, and lower third of profit centers which would have an impact on if a positive or negative return is obtained. Dhuyvetter and Langemeier (2010) analyzed the differences between producers in high, medium, and low profit centers. When the three categories of producers are compared to each other, those producers in the high profit center yield $85 per cow more revenue than those producers in the low profit center. High profit producers had costs of nearly $287 per cow less than low profits centers and $110 per cow less than middle profit centers. In every cost category, high profit producers had lower costs than low profit producers. When compared based on a net return per cow basis, high profit producers have larger net returns of $128.52 and $371.47 compared to the medium profit producers and low profit producers, respectively. They noted that an almost $190 difference in average net returns per cow was realized when the 30-year time period was divided in top, middle, and low 10-year averages. These differences in net return on a per cow basis demonstrate that there is greater variability across producers than across time. The most notable difference between these categories is the cost as over three-fourths of the net return difference

between high and low profit producers is due to cost differences. Thus, producers have the opportunity to increase net return by decreasing costs. In summary, although the average net returns over the 30-year time period indicate negative returns, this analysis proves that some producers are consistently attaining positive returns. The factor that is most likely differentiating these producers are their management skills.

Ten years of data were used in this research which may have biased the results since this is only a short period of time. Therefore, using Kansas Farm Management Association data, the ten years used in the research (2000 to 2009) were compared to the previous ten years (1990 to 1999) to identify any differences in the time periods. Return over variables cost on a per head basis was analyzed for the cow-calf, backgrounding, and backgrounding-finishing enterprises. The KFMA data breaks the beef cow enterprise into two categories: sell calves and sell feeders. The beef cow, sell calves enterprise has an average return over variable costs of $14.70 per head for 1990 to 1999 compared to an average return over variable costs of $79.13 per head for 2000 to 2009. Similarly, the beef cow, sell feeders enterprise has a lower average return over variable costs of $35.01 per head for 1990 to 1999 compared to $84.81 per head for 2000 to 2009. The backgrounding enterprise for 1990 to 1999 has an average return over variable costs of $2.48 per head while 2000 to 2009 has an average return over variable costs of -$1.48 per head. The backgrounding-finishing enterprise has an average return over variable costs of $24.51 per head for 1990 to 1999 and $36.27 per head for 2000 to 2009. All standard deviations are larger for the 2000 to 2009 time period except for the backgrounding enterprise. In summary, all enterprises, except for backgrounding, had a larger average return over variable costs per head in the 2000 to 2009 time period. However, this time period also had larger variability.

All transactions were assumed to occur on a cash basis in this research; therefore, risk management strategies such as hedging in the futures market were not incorporated into the model. If risk management strategies had been considered in this research, results may have been very different. Risk management may have resulted in optimal strategies that included retaining ownership as risk levels would have been decreased and net returns potentially increased for those scenarios that included retaining calves through the backgrounding phase or through the feedlot phase. Additionally, since the analysis of risk was based purely on prices, no production risk, such as weather conditions were factored into the analysis.

Several costs were assumed constant over the 10 year period in this research. Those costs held constant were taken as given from the 2009 Kansas Farm Management Association Guides. Thus, the prices were held constant over the 10 year period at the level they were at in 2009 which may be inaccurate as some costs had significant price variations over this period. For example, fuel costs are at much higher levels than 10 years ago; thus, this cost level is most likely too high for the earliest years in the time period which would have negatively affected net return levels.

6.3. Further Research

Further research in this area is needed in comparing additional alternative production practices that were not included in this research that could assist producers in their decisions. Examples include considering a preconditioning program, varying weaning dates and weaning weights, looking at different cattle breeds, or varying the length of the backgrounding and grazing periods. Additionally, it is important to note that this information needs to be updated regularly in order to keep this research as current and helpful to producers as possible.

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The analysis contains years of both very good returns and very bad returns. Most likely, if those years with very bad returns were removed from the analysis, results would have been more favorable to retain ownership of calves past weaning. A potential area for further research would be to look at the individual years in the time period and analyze what the optimal retained ownership scenario may have been for each year.

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