AN EXPLORATION OF THE EFFECTS OF BEGINNING DEBT LEVELS AND LOW CROP COMMODITY PRICES ON THE POST FINANCIAL DOWNTURN FINACIAL PERFORMANCE OF REPRESENTATIVE CROP, LIVESTOCK, AND DIVERSIFIED FARMS IN OKLAHOMA

By

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Abstract: After historically high levels of net farm income in 2012 and 2013, low commodity and livestock prices have combined with other factors to dramatically reduce farm income. These changes create financial stress for farmers, degrade the value of farmland and other farm assets, and have implications for agricultural credit markets and relationships. Most farmers and ranchers are looking for ways to improve financial performance, but more importantly are looking for information on how to mitigate the effects of financial stress in their operations. Active farmers and ranchers need information to survive the current and future periods of farm financial stress. The purpose of this research is to explore the extent of recent farm financial stress, and to determine what factors are contributing to the current cycle of farm financial stress. Specifically, recent trends in farm income and farm debt are explored, current farm financial position and performance is compared to previous years, and factors are determined that are associated with successful transition through periods of farm financial stress. This research examines the effect that leverage, and prices have on the intermediate survival of a farm business. A representative crop farm, cow-calf farm, and diversified farm are created from data that represent the average for all Oklahoma farms. The farms are evaluated at a low, medium, and high leverage position then simulated 10 years into the future. The debt-to-asset ratio at the end of year 10 is used to determine if the farm had a better or worse financial position. If the farm has a higher debt-to-asset ratio at the end of year 10, then it will be simulated through six different management scenarios. The research found that prices and the total amount of debt have a significant impact on farm financial health.

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CHAPTER I

INTRODUCTION

Background

After historically high levels of net farm income in 2012 and 2013, low commodity and livestock prices have combined with other factors to dramatically reduce farm income (Kauffman and Clark 2016). These changes create financial stress for farmers, degrade the value of farmland and other farm assets, and have implications for agricultural credit markets and relationships. Most farmers and ranchers are looking for ways to improve financial performance, but more importantly are looking for information on how to mitigate the effects of financial stress in their operations. Active farmers and ranchers need information to survive the current and future periods of farm financial stress.

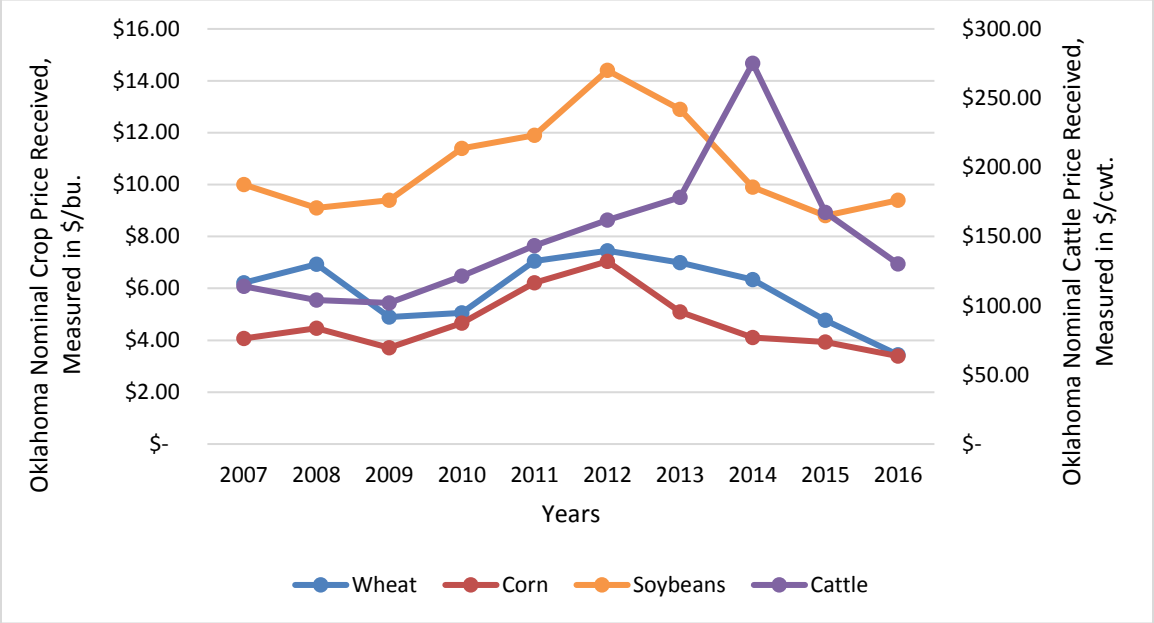
The seeds of the farm crisis of the 1980s were sown during the previous decade. The 1970s were a decade of prosperity for American agriculture. Over the first three years of the decade, net farm income doubled from $34 billion to $69 billion and the value of farmland increased 73 percent (in real 1982 dollars). This expansion of agriculture was largely debt financed, with outstanding farm mortgage debt increasing

57 percent between 1970 and 1978 (Barnett 2000). The increase in debt was supported by increased commodity prices and production, with US Secretary of Agriculture, Earl Butz, famously telling farmers in 1972 to "plant fence row to fence row" (Wyant 2008). In hindsight, this strong commodity market would only last for a short time, but long enough to make debt financing attractive. Soon, commodity prices would reverse course in response to the increased production.

Beginning in the late 1970s, commodity prices began to decline due to excess supply in the market, production costs rose at the same time, and the export boom collapsed, creating a perfect storm for financial stress. Eventually, agricultural producers could no longer make loan payments on farmland with the returns generated from farming that land. From 1981 to February 1985, the dollar appreciated more than 70 percent causing exports of domestic agriculture commodities to drop 50 percent by 1986. Declining exports coupled with low commodity prices, rising inflation, and drought sent net farm income and farm asset values into a downward spiral. Between 1980 and 1987, the value of farm assets dropped 30 percent nationally, and as a result farm lenders stopped offering to refinance loans when a borrower was unable to make payment (Barnett 2000).

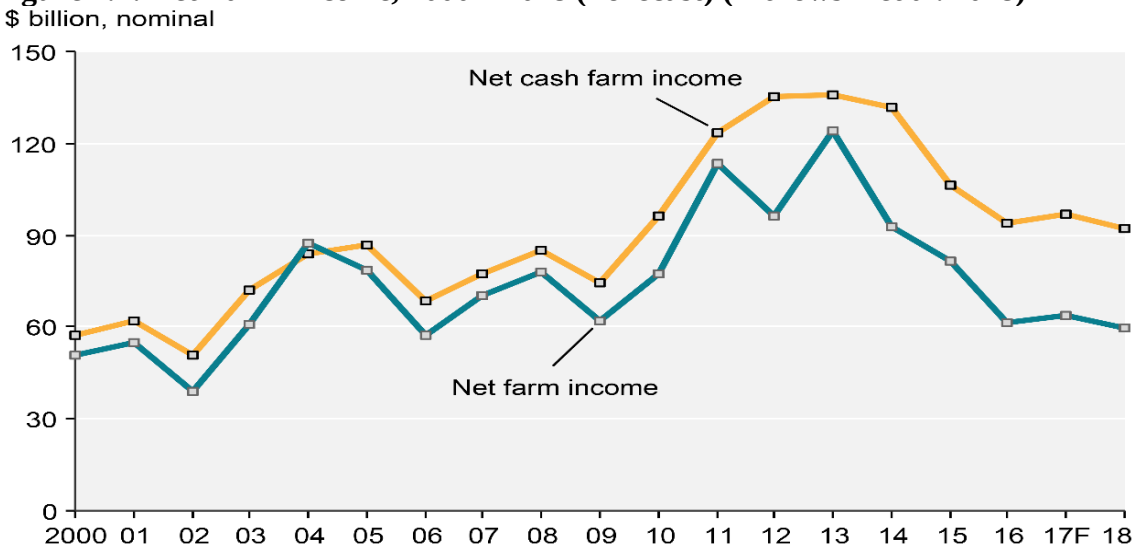
Recently, there have been financial indications that agriculture is on the cusp of a new era of financial stress. Figure 1.1 shows that nominal prices for corn, wheat, and soybeans were lower in 2016 than they were in both 2007 and 2011 (USDA NASS 2017a; USDA NASS 2017b; USDA NASS 2017c). The farm sector income forecast also projects that nominal prices for wheat and corn will be 4 percent and 3.5 percent lower respectively with the price received for soybeans up approximately 4.5 percent in 2018.

Figure 1.1: Oklahoma Crop & Cattle Prices 2007-2016 (USDA NASS 2017a; USDA NASS 2017b; USDA NASS 2017c)



The 2018 Farm Sector Income Forecast produced by the USDA projects that net farm income will decrease approximately 6.7 percent, the lowest nominal level since 2006 as seen in figure 1.2 (Litkowski et al. 2018).

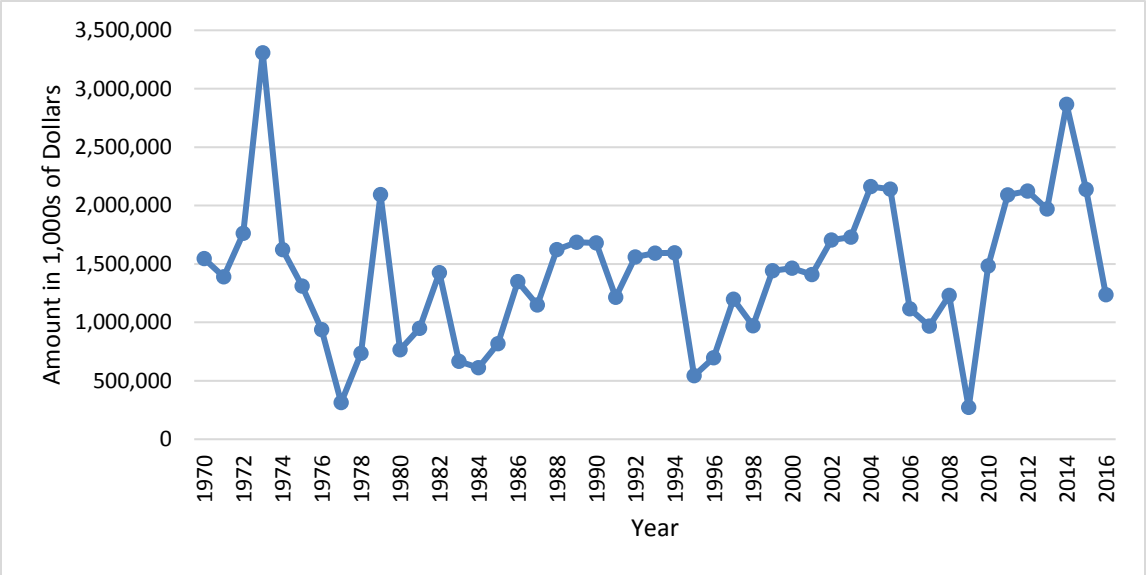
Figure 1.2: Net Farm Income, 2000 – 2018 (Forecast) (Litkowski et al. 2018)



While this forecast is a national projection, the outlook for Oklahoma is similar. Oklahoma real net farm income peaked in 2014 and drastically declined in the next two

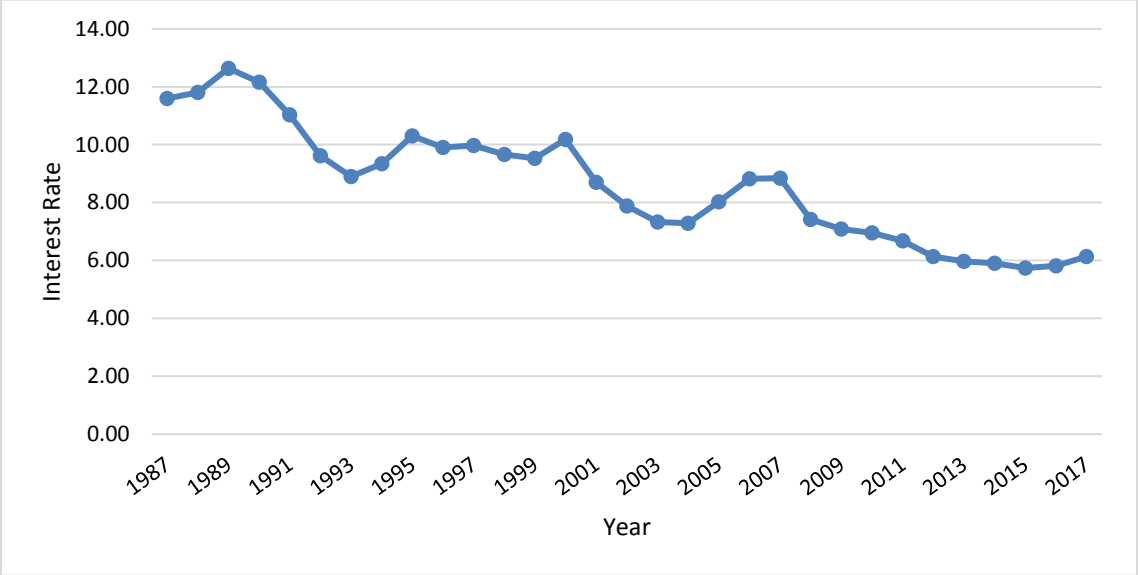
years. This pattern matches what was seen during the late 1970s and mid-1980s (figure 1.3), a period of significant financial stress in agriculture (USDA ERS 2018).

Figure 1.3: Oklahoma Real Net Farm Income 1970-2016 (USDA ERS 2018)



The *Ag Finance Databook*, published by the Kansas City branch of the Federal Reserve also reveals that the total volume of loans taken to pay for operating expenses has increased from 2016 to 2017. In the same time period, delinquency rates at commercial banks also increased (Kauffman and Clark 2017). It is highly important to recognize the role that interest rates play in the current farm financial climate. Historical data from the Federal Reserve Bank of Kansas City (figure 1.4) show that the fixed interest rate on agricultural loans are at their lowest point since 2007, and less than half of what they were in 1989 (Federal Reserve Bank of Kansas City 2018). All of the factors so far cited suggest that the current financial downturn in agriculture has the potential to devolve into something more, therefore, this research examines the effect that leverage, and prices have on the intermediate survival of a farm business.

Figure 1.4: Oklahoma Average Yearly Real Estate Loan Fixed Interest Rate 1987 – 2017 (Federal Reserve Bank of Kansas City 2018)



Problem Statement

In broad terms, farm financial stress is a problem that can result in farmers taking actions that range from simply cutting back on planned purchases and family living standards to liquidating assets to pay bills, and even complete bankruptcies. All these actions have long-term impacts not only on those individual farmers and farm families, but also on rural communities, input suppliers, and others (Boehlje, Thamodaran, and Barkema 1985). More specifically, farm financial stress contributes to personal financial stress within farm households and farm families.

Therefore, this research will be used to better understand the causes, nature and extent of farm financial stress. More importantly, how has farm financial performance changed over time and what factors are influencing farm financial performance?

Objectives

The overall purpose of this research is to quantify the current extent of farm financial stress, compare this to previous stress periods, and determine what factors contribute the most to farm financial stress (e.g. prices, indebtedness, interest rates, equipment values, etc.). The specific objects of this research are to:

1. Evaluate how changing commodity prices effect farm financial stress.
2. Evaluate the effect that total debt level has on farm financial stress.
3. Compare the performance of farms with and without livestock production.
4. Explore the effectiveness of various management strategies that may help guide a farm through periods of farm financial stress.

CHAPTER II

REVIEW OF LITERATURE

Creating Representative Farms

The concept of representative farms has been explored by agricultural economists for a century. While a uniform method for creating representative farms has not been established, a somewhat baseline definition has been. Taussig said that a representative farm is "… one not far in the lead, not equipped with the very latest and best plant and machinery, but well equipped, well led, and able to maintain itself permanently with substantive profits." (Taussig 1918). Alfred Marshall put a slightly different spin on Taussig's definition by saying that a representative farm is "… one which has had a fairly long life, and fair success, which is managed with normal ability, and which has normal access to the economics, external and internal, which belong to the aggregate volume of production; account being taken of the class of goods produced, the conditions of marketing them and the economic environment generally." (Marshall 1920). Both Marshall's and Taussig's definitions are more abstract then they are empirical in nature. They explain the economic nature of supply and profits instead of acting as a guide to making management decisions.

Holmes in 1923 was one of the first to use the representative farm approach to guide management decisions. He geographically divided Iowa into different farming areas based on existing enterprises, farming practices and environmental factors. Holmes expressed his concerns about making management and adjustment decisions for groups of farms saying "… even a small farm is a complex economic organism and every individual farm departs widely in one or more important characteristics from the so-called norm." (Holmes 1923). Holmes' work differs from this research, because he divided farms in Iowa into different groups whereas this study creates three composite farms from the data for all of Oklahoma.

One of the first to specify a quantitative procedure for determining the attributes of the typical farm was Elliott in 1928. He defined a 'typical farm' as "…a modal farm in a frequency distribution of farms from the same universe." (Elliott 1928). Elliott, Trapp, and Willard expand on the previous work which looked at the "type of farms" based on geography and included budgets of representative farms. These budgets reflected how farms adjusted budgeting in response to different prices. (Elliott, Trapp, and Willard 1928). This research will use budgets to estimates the income and expenses of each enterprise.

In evaluating Connecticut dairy farms, Davis (1936) used a different approach from previous studies and grouped farms in Connecticut based on the amount of labor used in each enterprise. Davis' research also used data from a sample survey instead of census data that Elliot used. Davis importantly points out that "…the variety of factors of managerial ability, financial and economic circumstances, soil and physical characteristics, and farm resources impinging on the farmer's net income are so many

that on no two farms are exactly the same factors responsible for the approximate size of the net income." (Davis 1936).

Davis' statement is of great importance to this research since our composite farms are meant to be representative of a large majority of commercial farms in Oklahoma, however no method can accurately take into account how and/or when management decisions are made. In the same vein as Davis' statement, Wilcox (1938) expressed concerns that previous "type-of-farming" studies failed to contribute to the field because previous studies did not do an adequate job connecting the fluctuations in resource use and their price sensitivities (Wilcox 1938). This research looks at both price sensitivity and will attempt to recommend management strategies for surviving period of financial stress.

Returning to the use of survey data, Mighell and Black (1951) constructed composite farms from the responses of "representative" dairy farms. They selected dairy operations based on size, quality of the land farmed, family labor supply, age of the primary operator, and the longevity of the operation. This method was most like Marshall's definition of a "representative producer" (Mighell and Black 1951). Similar work is currently being done by the Food and Agriculture Policy Research Institute (FAPRI) at the University of Missouri and the Agricultural and Food Policy Center (AFPC) at Texas A&M University. FAPRI and AFPC employ the use of producer panels to construct representative farms. The panels are similar in location, size, structure and type of production. While this analysis does not survey farmers, it is similar since it also constructs composite farms from data. (Zimmel, P. 2008; Zimmel, P. 2012; Richardson et al. 2016)

In a discussion article, Carter (1963) identifies many shortcomings and weaknesses of the representative farm approach. He points out that "the 'representative farm' studies are static in nature whereas the farm firm is operating in a dynamic framework." Carter suggests that any use of the representative farm approach should focus on a particular problem or stated purpose. He also points out that "A typical farm, however selected, remains typical only as long as the technology, institutions, and other attributing factors remain static." (Carter 1963). It is important to consider Carter's statement because while agriculture might currently be in a period of financial stress, the prices, yields and other factors used in this analysis can change in the course of a year or even a month. Nevertheless, this research will attempt to analyze the current financial condition of Oklahoma agriculture, and what might happen if low crop commodity prices continue to persist.

Nutt and Skees (1990) utilize a Monte Carlo simulation model to simulate a corn and soybean farm in Kentucky's Ohio Valley. This assessment seeks to establish procedures so that financial leverage will not affect the rate of return to equity, allowing the authors to compare farms with different debt-to-asset ratios and isolate the effects of government program participation. The model uses four debt-to-asset ratios (0 percent, 20 percent, 40 percent, and 60 percent), essentially creating four different farms. Each farm was simulated for 10 years, 100 times to achieve the Monte Carlo statistics (Nutt and Skees 1990).

Köbrich, Rehman, and Khan (2003) take a wholesale different approach to using representative farms as a decision-making tool. They collected information from farms in Chile and Pakistan and then grouped them into clusters of "roughly homogenous farmers

with similar circumstances for whom we can make the same recommendation." This definition is a combination of Elliott's from 1928 and Davis' from 1936. Before grouping farms into clusters, the authors used a six-step approach to establish the particular farming system for each cluster as follows: first, determine the specific framework, second, select variables, third, collect data, fourth, factor analysis, fifth, cluster analyses, and sixth, validation. Prior to the fourth step, the authors discard any variables that show no variability as well as any variables that are highly correlated. After grouping farms into clusters, the authors use multi-variate statistical modeling to present recommendations for constructing representative farm models. They conclude that their approach would be best utilized for studies in less developed countries where farming systems and types can be derived from scratch (Köbrich, Rehman, and Kahn 2003).

The authors clarify that "the inputs required at the beginning are the researchers' previous experience and knowledge of the area, the objectives of the typification exercise and, the quantitative information that is available." (Köbrich, Rehman, and Kahn 2003). Their statement forms part of the basis for this analysis since imperfect information exists about what the typical, average, or representative farm is in Oklahoma.

Most recently, Zhang and Tidgren (2018) employed the use of representative farm models and FINPACK simulations to evaluate the current downturn in the farm economy as compared to the downturns of the 1920s and 1980s from a structural and regulatory standpoint. They also look at the causes of the downturns of the 1920s, 1980s, and the current farm downturn and present their outlook on if the current financial downturn in agriculture will devolve into a situation like was seen in the 1980s or 1920s. The authors employ the use of three actual farms from the three different periods to build their

simulation models, identifying them as Farmer A, Farmer B, and Farmer C, and then they evaluate three different management strategies to assess how Farmer C could improve their financial outlook.

Farmer A is based off a farmer from *Iowa Land Values: 1803-1967* written by W.G. Murray. Farmer A owned a 311-acre farm and owed $11,000 on a mortgage for that land. A year later, Farmer A purchased a neighboring farm of 240-acres for $95,000. To do this, the farmer increased the mortgage on his home farm to $45,000 and borrowed $45,000 to purchase the new 240-acres. This made his debt $163 per acre, and with the market price at the time being $400 per acre, Farmer A's debt was less than half of the value of the land that he controlled (Zhang and Tidgren 2018). Farmer A began to encounter financial stress in 1921 when commodity prices began to fall, and eventually the value of the crops that Farmer A produced was less than the value of his principal and interest payment on his mortgages. Farmer A lost both farms in 1927 and 1928 because he had drained his borrowing capacity.

Farmer B comes from the 1990 book *Farming is in Our Blood* by P.C. Rosenblatt. Farmer B started farming in the mid-1970s with 160 acres of owned land he inherited and 500 acres of rented land. Wanting to expand his operation, Farmer B bought 320 acres at auction for $528,000. Farmer B paid a little more than 20 percent down and obtained two land loans. Loan 1 was a 10-year, $150,000 loan at 10 percent fixed interest, and loan 2 was a 15-year variable rate loan for $250,000 from the Federal Land Bank (FLB). Farmer B also had a $50,000 machinery loan due in 1982 and a $30,000 annual operating loan. Times became tough in the early 1980s when crude oil prices doubled and the cost of inputs like fertilizer, seed and chemical rose by 20 percent (Zhang and Tidgren 2018).

Because of a strong US dollar, agricultural exports were weak which, in turn, caused the prices of commodities to fall below Farmer B's cost of production, and set his farm income on a downward trend as well.

By 1983 Farmer B had about $1,000 per acre outstanding on each of his land loan, but high interest rates were beginning to cause significant financial issues. His harvest in the same year was bad, but Farmer B was still current on all his debt payments, however his working capital was less than $25,000. In early 1984 the FLB asked Farmer B for $50,000 of collateral to secure the loan, but neither lender of loan 1 or loan 2 was able to restructure the loan or reduce the interest rate. Farmer B got a $20,000 operating loan at 15 percent interest and by 1985 the value of Farmer B's land had declined by 30 percent. The FLB called in its loan, Farmer B was unable to refinance his loans and he was forced to put his farm, including his 160 inherited acres, up for auction and he was out of business (Zhang and Tidgren 2018).

Farmer C is based off of data collected by Iowa State University and analyzed in FINPACK (FINPACK 2018). Farmer C farms 1,223 acres, 223 acres are owned and 1,000 are leased for $257 per acre. Farmer C has $200,000 in cash and $113,969 of prepaid expenses and supplies before the 2015 season. His land is valued at close to $8,000 per acre, making his total asset value above $3 million in January 2015. Farmer C has $301,145 remaining on his 20-year land loan at a 5 percent fixed rate, he also holds a five-year machinery loan for $300,000 at 5 percent fixed interest, with final payment due in 2019. Farmer C's initial balance sheet is strong with a 24.3 percent debt-to-asset ratio, a current ratio of 2.26, and $272,886 of working capital.

Farmer C's yields in 2015 were near average and therefore he did not make any managerial changes in his operation, however, high production costs including the rental rate on his rented acres caused him to earn only $42,255 of net income. Farmer C's high loan payments on land and machinery caused his capital replacement margin to be negative. The authors point out that if Farmer C had trimmed his production expenses by $50 per acre or had negotiated a lower cash rent, he could have significantly improved his profitability. They also suggest that Farmer C could have refinanced his loans, while this would not affect profitability, it would slow the loss of working capital (Zhang and Tidgren 2018). Because Farmer C did not make any changes in management for the 2015 season, he lost $94,146 of cash available to pay bills and debts. The value of his land also declined by $1,000 per acre.

In the 2016 growing season, Farmer C had above average yields, but the prices he received were lower than they were in the 2015 season. The cost of production inputs decreased from the 2015 season and his cash rent was reduced by $50 per acre. Even though the value of his land decreased by $1,000, Farmer C's debt-to-asset ratio was 23.7 percent, a decline from the previous year. This is due mostly to the fact that Farmer C paid off a significant portion of his debt over the previous two years, however, because this farmer did not act to refinance his loans, his capital debt repayment margin was negative, and his term debt coverage ratio fell to 1.07.

The first management scenario Zhang and Tidgren work through for Farmer C is making no change to his operation or management practices. Farmer C has not refinanced any of his outstanding loans and began with a healthy current ratio. He did not lower his production costs, except for a $10 per acre reduction in his cash rent. The authors

hypothesize that in 2018 the value of Farmer C's land would drop $250 to $6,250 per acre. Because of lost debt repayment capacity from the previous year, Farmer C will have to sell some stored grain to cover debt payments and have cash on hand. Because of a strong balance sheet however, there is no risk of default for Farmer C.

The second scenario evaluates what would be the result of an interest rate hike. The authors assume that Farmer C's machinery and land loans are variable rate loans and that the rate has increased to eight percent. This rate would be more reflective of the interest rates of the 1920s and about half of the rates of the 1980s (Zhang and Tidgren 2018). They also assume that the land valuation capitalization rate increased to five percent, up from three percent, resulting from higher interest rates. This increased capitalization rate would cause land values to plummet to $3,900 per acre. Although land values would drop by almost 50 percent, Farmer C would still have a strong balance sheet, but his debt-to-asset ratio would increase to 27 percent and his total interest paid would close to double. In this scenario, Farmer C would have to adopt some sort of cost management and/or improved marketing strategies (Zhang and Tidgren 2018).

The final management situation for Farmer C is a substantial and sudden reduction of land values. The authors inflict a 30 percent reduction in value from the 2017 land values, citing stagnate commodity prices and farm income. At the same time, they assume that interest rates would remain flat at five percent. This reduction in land values would decrease the total asset value on his balance sheet but would not change his profitability, unless a lender requests more cash or collateral for loan security. Finally, Farmer C's debt repayment capacity would shrink about $10,000 compared to the baseline.

Between these three case studies, there are commonalities like falling farm income, increasing debt payments, and weakened borrowing capacity and working capital. Farmers A and C experience decreasing farm income because of declining commodity prices, which led to a draining of working capital and debt repayment capacity. Both farmers saw an increase in net farm income during "boom" years followed by a significant decline in years of financial downturn. Farmer B encountered a different situation where farm income was dropping while interest rates were increasing at the same time. These high interest rates made Farmer B's debt repayment capacity deteriorate more quickly than either Farmer A or Farmer C. The most important observation the authors make is that "Had farmer B stayed solvent with his farming operation in the late 1980s, he would have actually seen a rebound of the net farm income largely due to substantial support from government programs to combat the 1980s farm crisis" (Zhang and Tidgren 2018).

What Constitutes Financial Stress?

Financial stress cannot be perfectly quantified. Since the farm crisis of the 1980s, multiple definitions and metrics have been used to evaluate financial stress in the agriculture sector, but there is not one that better models the causes, nature or effect of financial stress. Financial stress has been evaluated across a range of criteria including measuring liquidity, profitability, debt repayment capacity, and risk. Along with multiple metrics, multiple definitions have been developed as to what constitutes financial stress. During the farm crisis, Jolly et al. (1985) defined farm financial stress as occurring when

"the capacity of an individual or firm or a specific sector of the economy to adjust to the forces causing stress is exceeded." Doye and Jolly (1987) say financial stress is when "certain economic forces assault and break down the adjustment capability of an individual, a firm, or a specific sector of the economy. Other authors define financial stress as "the inability to meet debt service payments, including principal and interest." (Briggeman 2010; Briggeman 2011; Dinterman, Katchova, and Harris 2018).

Studies done in the 1980s sought to derive the nature of the financial crisis and proposed potential solutions including to alleviate the effects of financial stress. Jolly et al. (1985) suggested that the duration of farm stress would depend on how quickly asset markets could rearrange ownership and credit institutions could write off unpayable debt and write new loans. Boehlje, Thamodaran and Barkema (1985) attributed the cause of the financial stress to be both lower incomes and more volatile interest rates. They suggested that asset restructuring, including liquidations, debt reductions, and equity infusions would be necessary to improve the long-term outlook for farms.

Jolly et.al. (1985) began by looking at the incidences of financial stress in the farm sector as well as its intensity and duration. They evaluated financial stress based on four long-run characteristics: profitability, liquidity, solvency, and risk-bearing ability as well as some aggregate indirect indicators solely at the farm level. In their analysis they found that 62 percent was held by farm operators with debt-to-asset ratios over 40 percent, 13.3 percent was held by insolvent operators and 29 percent by farms with debt-to-asset ratios greater than 70 percent. Additionally, 64 percent of the debt was controlled by farms with negative cash flows (Jolly et.al., 1985). This study established baseline metrics for future study of financial stress in the farm sector. More recently, those

findings were shown to be relevant in the current financial conditions of U.S. agriculture. Businesses with a debt-to-asset ratio over 40 percent are more vulnerable, especially when combined with lower liquidity (Burns, Tulman and Harris 2015).

Doye and Jolly (1987) sought to evaluate what structural changes would lead to a more stable financial outlook in agriculture. The authors use a random sample of U.S. farmers surveyed by *Farm Journal*, Iowa State University, and the University of Missouri. A sample of 8,000 operators was taken from the Farm Journal database. Data from 731 responses of commercial farm operators, defined as those with sales of $40,000 or more per year. Responses were weighted using USDA numbers of commercial operators, assets, and debts by region to derive a US value.

The authors develop a cash flow model where net cash flow (NCF) is modeled as a function of cash rate of return to operated assets, the value of owned assets, the value of rented assets, cash rental rate on rented assets, average rate of interest paid on outstanding debt, average rate of principal repayment on outstanding debt, level of outstanding debt, consumption expenditures for the farm family, off-farm income earned by the operator and spouse, and federal income taxes paid by the farm family. A second equation is created to model the amount of financial restructuring necessary for an operator with negative cash flow to break even. This is derived from the NCF equation. Change in NCF is modeled as a function of the percentage change in cash rate of return to operated assets, the cash rate of return to operated assets, the change in owned assets occurring in the restructuring process, the change in rented assets, the change in outstanding debt as a result of debt retirement from asset sales or debt discharge by the lender, the change in family living expenditures, and the change in off farm income.

The equations mentioned above are used to model the various farm operators' response to economic changes and/or adoption of government policy. In the simulation, a general series of financial adjustment is used for operators who have a negative NCF as follows: the amount of off-farm income is increased, the rate of return to operated assets is improved, additional assets are rented, on farms that qualify for financial assistance from programs, government program payments are applied to cash shortfalls, a partial liquidation of assets, and ultimately there's a total liquidation of assets, resulting in the farm operator leaving the farming business. A different series of steps is used if an operator has a positive NCF.

The authors set three criteria for what defines farm financial failure in their simulation. First, if the outstanding debt is greater than the current market value of assets. Second, if the operator is forced to completely liquidate assets in order to achieve a positive cash flow. Third, if the ratio of NCF to equity is less than -0.2. The authors also have defined certain farms as "technically insolvent" if a farms debt-to-asset ratio exceeds the cash recovery rate. These "technically insolvent" farms own no assets, or have severe financial problems as indicated by the NCF to equity ratio are assumed to exit the industry at the end of the year in which they are defined as financial failures. The model looks at the effects of leverage, cash flow constraints, and income on survivability (Doye and Jolly 1987).

In analyzing Kansas farms, Featherstone, Schroder, and Burton (1988) take a different approach to quantifying financial stress in the farm sector. Instead of looking at a farm's debt-to-asset ratio they evaluated a farm's performance based on their mean real rate of return to equity. The authors quantify the proportion of poor performance due to

excess leverage, high interest rates, or low rates of return to assets by identifying an average (or target) leverage ratio and interest rate for financially unsuccessful farms. For farms with a negative mean real rate of return to equity, the authors used the previously listed metrics to decompose the farm's financial problem into its constituent parts (Featherstone, Schroder, and Burton 1988).

At the end of the test, the geometric mean real rate of return to equity varied from -37.1 percent to 30.4 percent. Of the 492 observed farms, 283 had a geometric mean real rate of return to equity greater than 0, and 209 had a rate of return to equity less than 0. The geometric mean real rate of return to assets ranged from -9.7 percent to 30.1 percent. The leverage ratios for all farms ranged from 0 percent to 81.1 percent. The estimated real interest rates ranged from -10 percent to 9.9 percent. In the authors interpretation, the results suggested that 42 percent of the financially stressed farms would not benefit from debt buy-downs by the government since their most significant problem was low rates of returns to assets (Featherstone, Schroder, and Burton 1988).

Financial stress also affects new farmers and young farmers. D' Antoni, Mishra, and Chintawar (2009) developed a multinomial logit model to predict financial stress of farms owned/operated by young and beginning farmer. Farms were classified into four groups based on their financial position ranging from a favorable financial position to a vulnerable financial position. The authors found that farm ownership plays an important role in the financial position of the farm business. They suggest that young and beginning farmers who are tenants are more likely to be financially vulnerable compared to full owners due to the fact that tenant farmers have an additional debt burden. Tenants are 1.4 percent more likely to be financially stressed than full owners. Results show that

residential/lifestyle farms (small farms where the operators main occupation is other than farming) and large farms (farm sales >$500,000) are more likely to be financially vulnerable compared to farms in a favorable financial position (D' Antoni, Mishra, and Chintawar 2009).

Benchmarks developed by Oklahoma State University groups various levels of financial stress into a three-color system. The colors (green, yellow, and red) represents a good, fair, or poor farm financial position. Green zone farms have a debt-to-asset ratio of 0 to 30 percent, yellow zone farms have a debt to asset ratio of 31 to 59 percent and red zone farms have a debt to asset ratio of 60 percent or greater (Doye 2014). The Farm Financial Standards Council also uses this same method of benchmarking with slightly altered thresholds. This analysis will use the Oklahoma State benchmark levels in this analysis. It is important to note that leverage is not the only or best measure of financial stress. A number of financial measures including measures of solvency, profitability, and debt repayment capacity can also be used to evaluate financial stress.

Burns, Tulman, and Harris (2015) approach the topic by using a three-step approach. First, they compare the debt repayment capacity utilization and debt to asset percentage using both old and new ARMS data. Second, they classify a farm's financial position using a combination of the debt to asset percentage and net farm income. Lastly, they used a synthetic credit rating model to calculate the probability of default based on three criteria: capital debt repayment capacity, owner equity as a percentage of assets, and working capital as a percentage of assets. They found that a further decline in land values will only increase the leverage positions of certain sectors of the agriculture industry. Businesses with debt to asset ratios over 40 percent are more vulnerable,

especially when combined with lower liquidity. Larger farms (those with sales exceeding $1,000,000) are more vulnerable to a downturn in land values because they have higher debt to asset ratios and rent the majority of their land. Additionally, net land renters are more vulnerable when land values drop 35 percent. They note that the current financial climate does not resemble the climate of the 1980s due to historically low interest rates and considerably lower mean leverage positions.

Options to Alleviate Financial Stress

Brake and Boehlje (1985) suggested five short-term public policy methods to achieve greater financial stability in the agriculture sector. First is debt restructuring, including refinancing and converting short and intermediate term loans into long-term loans. The implication of this is that changing the loan term reduces the annual debt payment, in turn improving cash flow. The second policy option is principal forgiveness and debt write downs. A debt write-down acknowledges that the value of an asset has fallen below the amount it was financed at, a common situation in the 1980s however less common today. The principal forgiveness option is another method of reducing the annual debt obligation. The authors point out that "principal forgiveness represents a cost to the lender, and a principal buy-down is a cost to the taxpayers" (Brake and Boehlje 1985).

The third option is an interest rate buy down, the implications of which are discussed later. Option four is a moratorium on foreclosures. The authors suggest this approach as a way for the courts to facilitate borrowers and creditors to reaching a

solution together. This was largely achieved with the creation of Chapter 12 of the bankruptcy code. The final policy option is to change asset ownership. This approach is offered as a means to avoid asset liquidation by having lenders hold the title to assets and leasing the asset back to the debtor in place of the debtor making payments on the borrowed asset.

Jolly and Doye (1985) discuss a similar approach. Their suggestions include the creation of landholding entities whereby the landholding company could buy or lease properties and assets from financially stressed farmers and the farmer would be able to lease the asset back, reducing their debt obligation. The authors also evaluate a policy option of "do nothing." They say "a number of policy options already exist that will buy time" (Jolly and Doye 1985). Under this options, the authors assume that financial issues will be worked out between the farmer and their lenders rather than having to involve government policy in alleviating financial stress (Jolly and Doye 1985).

Boehlje, Thamodaran, and Barkema (1985) identify that some government policies have contributed to financial stress rather than alleviated it by encouraging more debt utilization and expanding farm size (Boehlje, Thamodaran, and Barkema 1985). A number of potential policies to alleviate financial stress are suggested, such as interest rate buy downs, debt moratoria, debt restructuring, and asset restructuring. Most authors agree that while interest rate buy downs are effective at reducing the debt burden, they are prohibitively expensive. (Boehlje, Thamodaran, and Barkema 1985; Brake and Boehlje 1985; Doye and Jolly 1987).

Hughes, Richardson, and Rister (1985) sought to characterize the effects of financial stress on the farm sector, evaluate the macroeconomic policies in agriculture,

and identify what caused the financial stress of the 1980s. The authors concluded that if government policies were to be continued, it would make the farm sector less prepared to handle exogenous shocks, less productive, and more concentrated. They also recommend "agricultural producers thoroughly investigate any potential impacts of future economic/farm policy scenarios before they make any major capital investment" (Hughes, Richardson, and Rister 1985). Lastly, they point out that the problems of the 1980s extended beyond the farm sector. The impacts of sustained financial stress could result in lowered domestic production, a concentration of domestic suppliers, and diminished rural communities.

The work done by Boehlje (1986) is similar to that of Brake and Boehlje (1985), Jolly and Doye (1985), and Boehlje, Thamodaran, and Barkema (1985). The author suggests that two approaches could help ease the financial stress in the agriculture sector. The first was to return to the economic policies of the 1970s that resulted in rapidly increasing land values, an expanding export market, and increasing profit margins. The second option would be for agriculture and industry to adapt to a new environment by restructuring to be able to weather periods of tight profit margins and poor export markets.

Long run adjustments include the option of mothballing excess capacity in agriculture as a means to stabilize the financial outlook of the agriculture sector. Specifically, the author suggests converting 20 to 30 million acres of erosive or low yielding farmland to nonuse as a way to simultaneously reduce excess production and reduce soil erosion. Other policy options include lowering resource values, debt reductions, restructuring asset ownership, and lowering interest rates (Boehlje 1986).

Alternatively, Batte, Farr, and Lee (1989) argue that reduction or deferrals are not effective in stabilizing a highly leveraged farm business. They evaluate a 700 acre family farm using the Farm Financial Simulation Model to determine the effects of policies that were designed to reduce the loan obligations of the farm. Measures of solvency, profitability, and cash flow of the representative farm are evaluated to determine the success. The authors recommend that financial management education and counselling for farm business that have a reasonable chance of survival would be more effective and less costly than credit subsidies. They conclude that "financial stability in the farm sector will be achieved through improved profitability, not credit subsidies." (Batte, Farr, and Lee 1989)

Arguably the most important government policy instituted to help alleviate the effects of financial stress is the creation of Chapter 12 bankruptcy. Dinterman, Katchova, and Harris (2018) detail how important this policy has been. The passage of the Family Farmer Bankruptcy Act of 1986 made Chapter 12 bankruptcy the preferred option for farms to ease financial stress because it allowed the farm business to continue operation after the creation of a debt restructuring plan. Congress extended the expiration date of Chapter 12 provisions 11 times, and eventually in 2005, passed the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA). BAPCPA amended Chapter 12 of the bankruptcy code, making it a permanent option. The amendment also allowed for higher debt limits, and implemented less strict income requirements than before (Dinterman, Katchova, and Harris 2018).

On and Off-Farm Effects of Financial Stress

Financial stress in the farm sector has impacts beyond the farm gate. Ginder, Stone, and Otto (1985) analyzed the effects that financial stress in the farm sector has on agribusiness firms and rural communities. Evaluating data from the state of Iowa, they determined that the financial crisis was the primary reason for an 18 percent decrease in Iowa's real retail and services sales from 1979-1984. They also discovered that farmers were continuing their outmigration from rural areas, reducing the economic base for small towns. However, only 13 percent of farmers who ceased farming for financial reasons moved away from the town in which they farmed. The authors point out that a major disruption of the economies of rural communities was averted due to off farm income and employment (Ginder, Stone, and Otto 1985).

Leistritz et al. (1986) analyze the effects of financial stress on the off-farm work behavior of farm operators and their spouses in North Dakota. The study uses discriminate and regression analysis to examine effects of selected individual, family, farm, area, and financial characteristics. The data are from a 1985 survey of 933 farm operators. The authors express the relationship by modeling the supply of off-farm labor as a function of the individual characteristics of farm operators and spouses, family characteristics, farm characteristics, area characteristics, and financial characteristics.

Selected findings of their study were that both operators and spouses who worked off the farm saw lower levels of net farm income and higher debt-to-asset ratios than those who did not work off-farm. Older operators or those who operated large farms or dairy farms tended not to be employed off the farm. Operators with higher levels of

education, higher debt-to-asset ratios, and with spouses who were employed off the farm were more likely to hold off farm jobs. Operators who had children between the ages of 5 and 18 were less likely to be employed off-farm. A portion of farm spouses sought off-farm work to supplement farm income that was inadequate to support family living. Operators of crop farms worked an additional 24 days off the farm compared to operators of other types of farms (Leistritz et al. 1986).

Toward the end of the farm crisis of the 1980s, Petrulis et al. (1987) looked at the affect farm financial stress was having on rural America. They identify that typically loss of farm workers occurred when gains were made in farm productivity and due in large part to the amount off-farm jobs. However, the 1980s saw the opposite, economic growth had been weak. The authors suggested that farming dependent areas transitioning to a more diverse economy could be difficult, mainly because "rural communities have many specialized human and business assets that may not be readily useable in other parts of the economy" (Petrulis et al. 1987). It could be argued that with advancements in technology, this no longer applies to rural America.

Briggeman (2011) looks at how off-farm income has become a critically important part of the financial health of the farm business. In 2008, 90 percent of all income for farm households came from off-farm sources. This exposes almost all farm operators to economic factors outside the farm gate much more than at any time in the past. If a farm operator, or their spouse, lose an off-farm job there is a potential that a farm operator wouldn't be able to cover their debt payments. The age of a farm operator also affects how important off-farm income is to the financial health of a farm business. Briggeman shows that farmers under the age of 35 are the most dependent on off-farm

income. In 2008, 93 percent of young farmers income was earned from off farm sources, compared to 68 percent for operators older than 35 (Briggeman 2011).

Key, Prager, and Burns (2017) look at how the type of farming operation effects farm income. They analyze 18 years of data from the Agricultural Resource Management Survey. Their results show that household income is more volatile on farms with assets in excess of $3 million. The household income of crop farms is more volatile than on livestock farms. 77 percent of income variation comes from farm income. Finally, the authors found that farm household income volatility was reduced by all types of government program payments (Key, Prager, and Burns 2017).

The ultimate step that can be taken for farms experiencing financial stress is bankruptcy. Dinterman, Katchova, and Harris (2018) look at the factors that influence bankruptcy decisions. They find that the regional unemployment rate and bankruptcy rate share a positive association. They also point out that it is mainly macroeconomic factors (interest rate, unemployment rate, etc.) that influence farm bankruptcies rather than microeconomic ones. While this option is a "last resort", its advantage is that it brings lenders and borrowers together and allows farmers to continue operations after developing a debt repayment plan (Dinterman, Katchova, and Harris 2018).

The Farm Crisis of the 1980s Compared to Today's Conditions

In an attempt to pinpoint the exact causes of the financial crisis of the 1980s Jolly and Doye (1985) isolate four events. First, the expanded international trade in the early 1970s. Second, the fiscal and monetary policy that kept interest rates near the inflation

rate. Third, the initiation of inflation control policies by the Federal Reserve in 1979. Fourth, the recession of 1981 that reduced the inflation rate. The authors also identify the high interest rates of the day that caused agricultural assets to be a less attractive investment than the alternatives available in the marketplace (Jolly and Doye 1985).

Boehlje (1986) points entirely to the economic events of the 1970s as the cause of the farm financial crisis of the 1980s. During the 1970s, growth in the agriculture sector was built on debt financing, when interest rates rose farmland values declined sharply, and farmers had difficulties making loan payments. Boehlje also identifies four characteristics of the financial stress that occurred in the 1980s. First, the debt-to-income ratio of the average farmers was higher due to reduced income. Second, the role of non-farm/off-farm income increased. Third, farmers attempted to carry a much larger debt load. Fourth, debt was having to be repaid at a quicker rate, this was instituted by institutional lenders as a means to reduce their exposure to interest rate risk (Boehlje 1986).

Peoples et al. (1992) reach all the back to the 1950s to identify the cause(s) of the 1980s farm financial crisis. The authors describe farm finance in the 1950s as "pay as you go" which kept a lid on growth in the agricultural sector. Farmers embarked on a more aggressive course of borrowing in the 1950s. Farm debt eventually doubled in the 1960s and then tripled by the end of the 1970s. When commodity prices dropped and the export markets collapsed, the farm sector too collapsed. The authors suggest that "in terms of wealth generation, the most successful farmers made money by aggressively adopting new technologies that enabled the farm operation to expand" (Peoples et al. 1992).

The federal government was slow to respond to the events of the early 1980s. Regulators of agricultural credit, like the Farm Credit Administration and the Federal Savings and Loan Insurance Corporation, were also slow to adapt to the changing economic environment. At the time, Congress and the President were of the opinion that the financial crisis in agriculture was temporary, and existing economic policy would be enough to manage the situation. However, Congress was forced to pass multiple pieces of legislation eventually creating the Farm Credit Service Assistance Board and the Federal Agricultural Mortgage Corporation (Farmer Mac). Today the Farm Credit Administration does not receive any appropriations from the federal government, but instead is supported by its member institutions (Peoples et al. 1992).

Zhang (2017) address the question of whether we will see the current financial situation turn into a crisis like that of the 1980s. He presents four points for why he feels it is unlikely the agriculture sector will go through another financial collapse. The first is stronger real income build-up prior to the current financial downturn. From 2003 to 2013, real net income grew by 8.1 percent per year, compared to 0.2 percent per year from 1910 to 1920 and -3.2 percent from 1973 to 1981. Second is historically low interest rates. In the 1980s, the mortgage payment on the typical farmland loan was three times higher than the typical cash rent and extending the repayment from 15 to 30 years did "almost nothing" to alleviate the financial burden faced by landowners. However, the current low interest rate environment makes loan restructuring a potential option (Zhang 2017).

The third point presented is more prudent agricultural lending in part driven by more stringent regulations. The mass expansion in agriculture during the 1970s was largely debt driven and when interest rates began to rise in the 1980s, this caused the

collapse of many farmers and agriculture banks. The current situation shows a much better outlook since the amount of debt is lower than it was during the 1980s, as evidence by the low US farm debt-to-asset ratio and the low rate of delinquency on farm loans (Zhang 2017). The final reason the author presents for why it is unlikely the current financial downturn will be like the farm crisis of the 1980s is that there is a stronger government safety net. Zhang notes that in 1987, 50 million acres of farmland in the United States was covered by the Federal Crop Insurance program. In 2015, 25 million acres of farmland was covered in Iowa alone (Zhang 2017).

Stephen Gabriel, Chief Economist with the Farm Credit Administration argues that the economic conditions of the 1970s, including a weak U.S. dollar and unexpected wheat demand from the Soviet Union, set up agriculture to fail in the 1980s. The confluence of historically high interest rates, a spike in oil prices, the double-dip recession of the 1980s, and a strengthening U.S. dollar all hammered the U.S. agriculture sector into the ground. Gabriel distinguished that the Farm Credit System is much more prepared to withstand a financial crisis today than they were in the 1980s. Changes in loan underwriting practices and increased system-wide capitalization will be the cushion (Gabriel 2017).

Zhang and Tidgren (2018) take the work of Zhang (2017) and expand on it by comparing the current farm financial downturn with the financial situations of the 1980s and 1920s. The authors discuss two distinct categories; economic factors (including interest rates and income), and the regulatory environment (including lending regulations, lending practices, and the availability of agricultural credit). In terms of income, real income growth was stronger before the current downturn due mostly to high commodity

prices which grew net farm income and placed producers in a better position to ride out a financial downturn. According to Dr. Neil Harl, gains in gross farm income and land value during the 1980s were "illusionary" and being bolstered by inflation (Harl 1990).

Historically low interest rates also have played a key factor in the current financial situation. Zhang and Tidgren compare the Treasury constant maturity rate and farmland mortgage rates and find that "…the interest situation much more closely resembles that of the 1920s more than the 1980s" (Zhang and Tidgren 2018). The implication of this observation is that since current interest rates are significantly lower than they were in the 1980s and moderately lower than the 1920s, loan restructuring is a possible option for farm managers looking to reduce their financial burden. Some farm lenders are now recommending to their clients to refinance loans, capturing more favorable interest rates and improve their debt repayment capacity (ABA 2017).

As they look at today's regulatory environment when compared to the regulatory environment of the 1920s and 1980s, the authors state that "the current environment is more highly regulated, lenders employ more stringent underwriting practices, and banks are subject to higher capitalization requirements" (Zhang and Tidgren 2018). Alongside these regulatory changes in the industry, the landscape of farm lending is dramatically different than is was in either two of the comparable time periods. In 1920, 70 percent of farmland mortgages were held by private individuals compared to 31 percent in 1980, and 5.6 percent in 2016 (Zhang and Tidgren 2018).

The diversification of lenders is different as well. Today the Farm Credit Service writes approximately 46 percent of farmland loans and commercial banks write approximately 38 percent. Commercial banks wrote nine percent of farmland loans in

1980 and 13 percent in 1920. The authors point out that in 1980, commercial banks wrote 40 percent of non-real estate debt and that the shift to more institutional lending in agriculture has been accompanied by an increase in financial regulations. An increase in agricultural lending at commercial banks has also led to more consolidation in the banking sector (Zhang and Tidgren 2018).

In 2017, 1,421 financial institutions met the Federal Deposit Insurance Corporation's (FDIC) definition of an "agricultural" or "farm" bank, whereas in 1980, 4,316 institutions met this definition (Zhang and Tidgren 2018). Consolidation of banks and lending institutions has caused the loan portfolios to become more diversified. The authors point to this diversification and the creation of Farmer Mac as the main reasons why it is unlikely that we will experience a widespread collapse of agricultural banks and the agricultural industry like was seen in the 1980s. This is not to say that there is no risk in agricultural lending or borrowing, quite the contrary. Risk still exists, when downward financial trends hit agriculture lenders are still less likely to renew operating loans for borrowers experiencing financial stress (Zhang and Tidgren 2018).

Stemming from what occurred in the 1980s, lenders have made changes to their lending practices and policies to avoid a repeat of the 1980s financial crisis. Regulators have increased loan underwriting requirements and lenders have adopted more conservative lending practices. In the 1980s, easily available credit made land prices jump, allowing farmers to use inflated land values to expand their operations by obtaining new loans. In this era, lenders regularly would use inflated market values of assets and current crop prices to make lending decisions rather than conducting a cash flow analysis. Regulations now require that lenders use cash flow as opposed to the value of assets or

collateral to evaluate loan eligibility (Zhang and Tidgren 2018). In addition to these internal changes, federal banking and lending regulations have changes dramatically as well.

Today, the FDIC requires all its member institutions to use prudent underwriting practices. The Office of the Comptroller of the Currency (OCC), which supervises banks, requires banks to avoid a concentration of agriculture-based loans, and places set limits on lending activities, requiring the loan to value ratio for farmland loans to be less than 85 percent. The OCC handbook directs that lenders should base the value of collateral on expected average cash flow over multiple years as opposed to the market value of assets (OCC 2017). Although the OCC allows a loan to value ratio of less than or equal to 85 percent, the Farm Credit Service's standard operating practice is a 50 percent loan to value ratio (Zhang and Tidgren 2018). An increase in capitalization requirements has accompanied more stringent lending practices in the financial sector.

Federal regulations did not specify a numeric requirement for the capital holding of banks prior to the 1980s, but by 1988, federal regulations had been amended to require that banks hold more low-risk capital. The authors draw the comparison "in contrast, the agricultural banks that failed in the 1980s tended to have more high-risk capital and fewer low-risk assets such as federal government securities" (Zhang and Tidgren 2018). Today, all FDIC insured banks are required to maintain a total capital to total risk-weighted asset ratio of eight percent. Since the 1980s, farm banks have been increasing their reserves of capital which will provide them with a buffer to weather another downturn in the farm economy (Zhang and Tidgren 2018).

Zhang and Tidgren argue that the current downturn in the farm economy can be traced down as a liquidity and working capital problem and not a solvency problem like was seen in the 1980s. They also present three economic and regulatory reasons they feel that the current farm downturn is unlikely to devolve into a situation like the 1980s. First, when they compare the three periods of boom and bust in agriculture, the growth of farm income has been stronger in recent decades than it was in the 1920s or 1980s. Second, banking regulators and farm lenders have made their loan underwriting requirements more stringent including basing lending decisions off of cash flow analysis rather than the market value of collateral. Third, the interest rate environment of today is much more favorable than it was in the 1920s or 1980s which limits the amount of debt held by farmers and banks and keeps asset values strong (Zhang and Tidgren 2018).

Dinterman, Katchova, and Harris (2018) point to the rapid rise in farmland value followed by a sudden drop in the value paired with historically high interest rates as the cause of the 1980s farm crisis. Farmers had easy access to credit during this time and net farm income was on the decline. The trend of declining net farm income and increasing debt use has reoccurred and is projected to continue beyond 2017. The current trends follow a period of rapid appreciation of land values and net farm incomes, paralleling the financial crisis of the 1980s. An important difference between the 1980s farm crisis and the current economic climate the authors identify is the ability of farms to seek financial relief through Chapter 12 bankruptcy. This option changes the farmer-lender relationship favoring farmers (Dinterman, Katchova, and Harris 2018).

Summary

While no study exists that lays out a complete framework for this analysis, pieces of previous studies will serve as the guide for the methodology of this work. The work of Zhang and Tidgren (2018) will serve as the main framework for how representative farms are used in this study. Instead of using actual farms as the representative farms, this study will create composite farms from available data. This analysis will use FINPACK for the simulations like the work of Zhang and Tidgren (2018). After farms have been simulated 10 years forward, measures of liquidity, solvency, profitability, and debt repayment capacity will be evaluated in comparison to the work of Jolly et al. (1985). Jolly et al. (1985) also established the 40 percent debt-to-asset ratio threshold for financial stress. The work of Doye (2014) established the other financial standards that will be used.

It is important to recognize the differences between the 1980s and now as these differences alter the expectations of the effects of the current financial stress. One of the main factors that exacerbated the problems of the 1980s was historically high interest rates. These high interest rates caused debt repayment and cash flow problems for producers (Jolly and Doye 1985; Boehlje 1986; Peoples et al. 1992). Today's environment is markedly different with interest rates at historic lows. While crop prices are creating cash flow issues for producers, Zhang (2017) feels it is unlikely that the current financial stress in agriculture is unlikely to degrade into a full-fledged financial crisis. Zhang and Tidgren (2018) point to the changes that have been made in the regulatory environment as the prevention to another financial crisis.

CHAPTER III

METHODOLOGY

Conceptual Framework and Contentions

For this analysis, three different representative farms were created, a crop farm, a cow-calf ranch, and a diversified farm that combines the crop and cow-calf farms into one operation. Each farm type was individually analyzed at three leverage positions: low, medium, and high.

All Farms

To achieve the various leverage positions on each type of farm, it is assumed that the loans on the low leverage farms are older and the high leverage farms are newer, so that the low leverage farms have paid off a greater portion of their loans at the beginning of the first year of simulation. For equipment and titled vehicles, the low leverage farm took out the loan in 2014, the medium leverage farm took out the loan in 2015 and the high leverage farm took out the loan in 2017. On livestock and cattle pens the low leverage secured their loan in 2010, the medium leverage in 2012, and the high leverage farm in 2015. Real estate was purchased in 1993 for the low leverage cases, 2003 for the medium leverage farms, and 2013 in the high leverage case. In the case of the low and medium leveraged diversified farms, their personal loans were taken out in 2017 and 2018 respectively.

All machinery is financed on five-year, 3.25 percent fixed rate loans (John Deere US 2017). Prices for machinery and implements were taken directly from the John Deere

website on December 18, 2017 (John Deere US 2017). All vehicles are financed on five-year, 5 percent fixed rate loan (Ford Motor Credit Company 2017). All land is financed on 30-year loans. Since the land purchase date is highly varied, interest rate on the land loans are 8.9 percent for the low leverage farms, 7.325 percent for the medium leverage farms, and 5.975 percent for the high leverage farms (Federal Reserve Bank of Kansas City 2018). The personal loan has a six percent rate and a three-year term. A 20 percent down payment is assumed on all tractors, implements, titled vehicles, and real estate.

Tractors, implements and vehicles are sold at the end of year five and new machinery is purchased at the same time. The salvage value for equipment is calculated using formula 3.1 which comes from Iowa State University's *Ag Decision Maker* (Edwards 2015). Property tax is assumed to be $2 per owned acre of land and personal property tax is assumed to be 1 percent of the market value of equipment. The farm operator has a spouse with an off-farm job that contributed $40,000 to the business, and $60,000 per year is withdrawn for farm family living expenses. General farm liability insurance costs $2,200 per year.

(3.1)	$Salvage\ Value = current\ list\ price * remaining\ value\ factor$

Crop Farm

The baseline representative crop farm for this study is 444 acres, the average Oklahoma farm is 438 acres (ODAFF 2017). It is assumed that out of the 444 acres, 111 acres (25 percent) is owned and 333 acres (75 percent) is leased. The proportion of owned and leased land was approximated from the Kansas Farm Management Association South Central Region Summary Books from 2007 to 2016. The actual averages are 26.9 percent owned and 73.1 percent leased, for ease of computation, these

numbers are rounded to 25 percent and 75 percent. Land is rented for $31.60 per acre which is the Oklahoma average from 2007 to 2016 (USDA NASS 2017d). Three crops are grown: winter wheat (representing cereal grains), corn (representing feed grains) and soybeans (representing oil crops). Each crop is allocated 148 acres, or $\frac{1}{3}$ of the 444 acres per crop.

For the baseline farm, the three-year average yield is used to reflect average conditions. The three-year average is a better representation of average conditions opposed to the 10-year average yield because the three-year yield incorporates both historical yields and advancements in genetics and technology. The average yield is calculated from USDA reports for Oklahoma for the years 2015 to 2017 for wheat and 2014 to 2016 for corn and soybeans. This difference can be attributed to data reporting since wheat is a summer harvested crop with corn and soybeans being fall harvested crops. Corn yield is estimated to be 132 bushels per acre (USDA NASS 2017f; USDA NASS 2016a), wheat yield is 33 bushels per acre (Marshall 2017) and soybean yield is 29 bushels per acre (USDA NASS 2017g; USDA NASS 2016b). Yields are assumed to be constant throughout the 10-year simulation.

The prices received used in the baseline scenario are the Oklahoma 10-year average price aggregated from the National Agricultural Statistics Service (NASS) data (figure 1.1). The 10-year averages are $4.67 per bushel for corn (USDA NASS 2017a), $5.91 per bushel for wheat (USDA NASS 2017b), and $10.72 per bushel for soybeans (USDA NASS 2017c). Prices are assumed to be constant throughout the 10-year simulation[1], and all grain is sold as soon as it is harvested and not stored for future sale.

[1] Except when prices are shocked as described later.

Assets and liabilities are detailed in table 3.1. Current assets range from $35,000 in the low leverage case, to $20,000 in the medium leverage case, and $15,000 in the high leverage case. Current assets include the value of cash and checking accounts and prepaid expenses and supplies. The crop farm utilizes a tractor, planter, seed drill, and pickup truck totaling $363,158 of intermediate assets. Long term assets include the value of owned land and the value of buildings and improvements. A market-value based balance sheet is used to better reflect the changing values of land in the simulation. Land prices come from the Oklahoma State University Land Values website (OSU 2018). In the low and medium leverage cases, the value of the land is greater than the purchase price of the land. The farm operator holds $260,000 of personal assets, including a $250,000 life insurance policy. The specific values for current assets, buildings and improvements, and personal assets at each leverage position are arbitrarily chosen to achieve the desired year zero debt-to-asset ratio.

Current liabilities are $25,000 in the low leverage case, $50,000 for medium leverage and $75,000 for high leverage. Current liabilities are accounts payable and other accrued expenses. Current loans are $15,000 in the low leverage case, $25,000 for medium leverage and $30,000 for high leverage. These represent an annual revolving line of credit for the operator. The intermediate loan category covers the loan the operator takes out on their machinery, vehicles, and equipment. The value of long-term loans is the mortgage on the operator's farm.

The low leverage farm was purchased in 1993 for $530 per acre, the medium leverage farm was purchased in 2003 for $714 per acre, and the high leverage farm was purchased in 2013 for $1,955 per acre (OSU 2018). Land purchase values are from the

Oklahoma State University Extension Agricultural Land Values page (OSU 2018). Finally, the low leverage farm and medium leverage farms have $60,000 and $90,000 of personal liabilities, respectively, while the high leverage case has $0. The specific values for current liabilities, current loans, personal liabilities, and land purchase years at each leverage position are arbitrarily chosen to achieve the desired year zero debt-to-asset ratio.

Table 3.1: Crop Farm Beginning Balance Sheet Summaries

CROP FARM					
Low Leverage		Medium Leverage		High Leverage	
Current Assets	$35,000	Current Assets	$20,000	Current Assets	$15,000
Intermediate Assets	$363,158	Intermediate Assets	$363,158	Intermediate Assets	$363,158
Long Term Assets	$245,002	Long Term Assets	$220,002	Long Term Assets	$245,002
Personal Assets	$260,000	Personal Assets	$260,000	Personal Assets	$260,000
Current Liabilities	$25,000	Current Liabilities	$50,000	Current Liabilities	$75,000
Current Loans	$15,000	Current Loans	$25,000	Current Loans	$30,000
Intermediate Loans	$62,930	Intermediate Loans	$62,930	Intermediate Loans	$182,481
Long Term Loans	$16,999	Long Term Loans	$51,419	Long Term Loans	$178,437
Personal Liabilities	$60,000	Personal Liabilities	$90,000	Personal Liabilities	$0
Personal Loans	$0	Personal Loans	$0	Personal Loans	$0

Cow-Calf Farm

The baseline representative cow-calf operation is 3,000 acres with 444 acres owned, and the remaining 2,556 acres are leased. Land is leased at a rate of $11.75 per acre, the Oklahoma average from 2007 to 2016 (USDA NASS 2017e). The cow-calf farm maintains a herd of 300 cows and 10 bulls. The total acreage for the cow-calf farm assumes 10 acres per cow-calf pair. The owned acreage for the cow-calf farm matches

the total acreage for the crop farm. A conception rate of 87.3 percent and a death loss rate of 4.2 percent is used, leaving 251 calves to sell each year (OSU 2017). Calves are sold at 525 pounds (OSU 2017) for $149.78 per hundredweight, immediately after they are weaned. The sale price is the Oklahoma average annual steer and heifer calf price for 2007 to 2016 from the Livestock Marketing Information Center.

Assets and liabilities for each cow-calf farm leverage position are detailed in table 3.2. Beginning current assets are $35,000 for the low leverage producer, $25,000 for the medium leverage producer and $15,000 for the higher leverage producer. Current assets include the value of cash and checking accounts and prepaid expenses and supplies. The operation, at each leverage position, has $203,373 of livestock held for sale, representing 251 calves sold for a total of $197,373, 30 cull cows (10 percent cull rate) sold for $175 per head, and 5 cull bulls (50 percent cull rate) sold for $150 per head at the beginning of the simulation. A total of $540,832 of intermediate assets are held; which consists of a front-end loader, feed truck, pickup truck, and a livestock trailer at each leverage position.

Long term assets include the value of owned land and the value of buildings and improvements. A market-value based balance sheet is used to better reflect the changing values of land in the simulation. Land prices come from the Oklahoma State University Land Values website (OSU 2018). In the low and medium leverage cases, the value of the land is greater than the purchase price of the land. Additionally, the farm owns a working pen system with a squeeze chute that was financed at purchase that are included in the value of long-term assets. The farm operator holds $260,000 of personal assets, including a $250,000 life insurance policy. The specific values for current assets, cull

cows and bulls, buildings and improvements, and personal assets at each leverage position are arbitrarily chosen to achieve the desired year 0 debt-to-asset ratio.

Current liabilities are $10,000 in the low leverage case, $20,000 for medium leverage and $30,000 for high leverage. Current liabilities reflect the value of accounts payable and other accrued expenses. Current loans include a revolving line of credit of $30,000 in the low leverage case, $40,000 for medium leverage and $35,000 for the highly leveraged farm. The intermediate loan category covers the loan the operator takes out on their machinery, vehicles, and equipment. The value of long-term loans is the mortgage on the operator's farm, the loan used to purchase cattle, and the loan for the squeeze chute and pen system. The low leverage farm was purchased in 1993 for $346 per acre, the medium leverage farm was purchased in 2003 for $847 per acre, and the high leverage farm was purchased in 2013 for $1,723 per acre (OSU 2018). Land purchase values are from the Oklahoma State University Extension Agricultural Land Values page. The low leverage farm and medium leverage farms have $90,000 and $80,000 of personal liabilities, respectively, while the high leverage case has $0. Finally, the farm incurs $10,000 of hired labor each year. The specific values for current liabilities, current loans, personal liabilities, land purchase years, and hired labor at each leverage position are arbitrarily chosen to achieve the desired year 0 debt-to-asset ratio.

Table 3.2: Cow-Calf Farm Beginning Balance Sheet Summaries

COW-CALF FARM					
Low Leverage		Medium Leverage		High Leverage	
Current Assets	$35,000	Current Assets	$25,000	Current Assets	$15,000
Livestock Held for Sale	$203,373	Livestock Held for Sale	$203,373	Livestock Held for Sale	$203,373
Intermediate Assets	$540,832	Intermediate Assets	$540,832	Intermediate Assets	$540,832
Long Term Assets	$949,651	Long Term Assets	$974,236	Long Term Assets	$1,214,236
Personal Assets	$260,000	Personal Assets	$260,000	Personal Assets	$260,000
Current Liabilities	$20,000	Current Liabilities	$30,000	Current Liabilities	$40,000
Current Loans	$30,000	Current Loans	$40,000	Current Loans	$35,000
Intermediate Loans	$21,066	Intermediate Loans	$34,209	Intermediate Loans	$60,385
Long Term Loans	$135,010	Long Term Loans	$502,945	Long Term Loans	$1,111,274
Personal Liabilities	$90,000	Personal Liabilities	$80,000	Personal Liabilities	$0
Personal Loans	$0	Personal Loans	$0	Personal Loans	$0

Diversified Farm

The baseline representative diversified operation has 444 acres of cropland and 3000 acres for a cow-calf operation. The 444 acres of cropland are owned in addition to 444 acres of owned pastureland for the cow-calf operation. The remaining 2,556 acres of pastureland are leased at a rate of $11.75 per acre (USDA NASS 2017e). A conception rate of 87.3 percent and a death loss rate of 4.2 percent is used, leaving 251 calves to sell each year (OSU 2017). Calves are sold at 525 pounds (OSU 2017) for $149.78 per hundredweight, immediately after they are weaned. The sale price is the average annual steer and heifer calf price for 2007 to 2016 from the Livestock Marketing Information Center.

Assets and liabilities for each leverage position are detailed in table 3.3. Beginning current assets are $80,000 for the low leverage producer, $40,000 for the

medium leverage producer and $80,000 for the higher leverage producer. Current assets include the value of cash and checking accounts and prepaid expenses and supplies. The operation, at each leverage position, has $203,373 of livestock held for sale, representing 251 calves sold for a total of $197,373, 30 cull cows (10 percent cull rate) sold for $175 per head, and 5 cull bulls (50 percent cull rate) sold for $150 per head at the beginning of the simulation. A total of $868,305 of intermediate assets are held. The diversified farm, at each leverage position, utilizes a tractor, planter, seed drill, front-end loader, feed truck, pickup truck, and a livestock trailer.

Long term assets include the value of owned land and the value of buildings and improvements. A market-value based balance sheet is used to better reflect the changing values of land in the simulation. Land prices come from the Oklahoma State University Land Values website (OSU 2018). In the low and medium leverage cases, the value of the land is greater than the purchase price of the land. Additionally, the farm owns a working pen system with a squeeze chute that was financed at purchase that are included in the value of long-term assets. The farm operator holds $260,000 of personal assets in the low and medium leverage cases, and $330,000 in the high leverage case. The specific values for current assets, cull cows and bulls, buildings and improvements, and personal assets at each leverage position are arbitrarily chosen to achieve the desired year zero debt-to-asset ratio.

Current liabilities are $50,000 in the low leverage case, $80,000 for medium leverage and $60,000 for high leverage. Current liabilities reflect the value of accounts payable and other accrued expenses. Current loans include a revolving line of credit of $30,000 in the low leverage case, $40,000 for medium leverage and $30,000 for the

highly leveraged farm. The intermediate loan category covers the loan the operator takes out on their machinery, vehicles, and equipment. The value of long-term loans is the mortgage on the operator's farm, the loan used to purchase cattle, and the loan for the squeeze chute and pen system.

The cropland for the low leverage farm was purchased in 1993 for $530 per acre, the cropland for the medium leverage farm was purchased in 2003 for $714 per acre, and cropland for the high leverage farm was purchased in 2013 for $1,955 per acre. The pastureland for the low leverage farm was purchased in 1993 for $346 per acre, the pastureland for the medium leverage farm was purchased in 2003 for $847 per acre, and the pastureland for the high leverage farm was purchased in 2013 for $1,723 per acre. Land purchase values are from the Oklahoma State University Extension Agricultural Land Values page (OSU 2018).

The low leverage farm and medium leverage farms have $90,000 and $100,000 of personal liabilities respectively. The low and medium leverage farms also hold $35,485 and $67,743 of personal loans respectively. Finally, the farm incurs $10,000 of hired labor each year. The specific values for current liabilities, current loans, personal liabilities, personal loans, land purchase years, and hired labor at each leverage position are arbitrarily chosen to achieve the desired year zero debt-to-asset ratio.

Table 3.3: Diversified Farm Beginning Balance Sheet Summaries

Diversified Farm					
Low Leverage		Medium Leverage		High Leverage	
Current Assets	$80,000	Current Assets	$40,000	Current Assets	$80,000
Livestock Held for Sale	$203,373	Livestock Held for Sale	$203,373	Livestock Held for Sale	$203,373
Intermediate Assets	$868,305	Intermediate Assets	$868,305	Intermediate Assets	$868,305
Long Term Assets	$1,804,244	Long Term Assets	$1,814,244	Long Term Assets	$2,354,244
Personal Assets	$260,000	Personal Assets	$260,000	Personal Assets	$330,000
Current Liabilities	$50,000	Current Liabilities	$80,000	Current Liabilities	$60,000
Current Loans	$30,000	Current Loans	$40,000	Current Loans	$30,000
Intermediate Loans	$76,131	Intermediate Loans	$76,131	Intermediate Loans	$220,396
Long Term Loans	$203,007	Long Term Loans	$708,621	Long Term Loans	$1,825,022
Personal Liabilities	$90,000	Personal Liabilities	$100,000	Personal Liabilities	$0
Personal Loans	$35,485	Personal Loans	$67,743	Personal Loans	$0

Methods

Before the first year of the model projections (non-stochastic simulation), the low leveraged farms had a debt to asset ratio of 20 percent, the medium leverage farms had a debt to asset ratio of 40 percent and the high leveraged farms had a debt to asset ratio of 60 percent, adapting part of the method used by Nutt and Skees (1990). Each leverage position was based off the Oklahoma Cooperative Extension Farm and Ranch Stress Test (Doye 2014). To achieve the various leverage positions, the amount of assets is decreased, and liabilities increased to move from the low leverage position to the high leverage position.

First, budgets for each crop and livestock enterprise were created in FINPACK (FINPACK 2018) using information from Oklahoma State University Sample Enterprise Budgets (OSU 2017). Data from the 2017 Oklahoma Agricultural Statistics book are used to determine the average acreage of an Oklahoma farm (ODAFF 2017). Furthermore, data from NASS are used to determine the 10-year average price for various crops, livestock, and land rents (USDA NASS 2017a; USDA NASS 2017b; USDA NASS 2017c). Next, balance sheets were created in FINPACK for each of the nine baseline scenarios.

Baseline Simulations

Financial performance information for each scenario was projected, or "simulated", 10 years forward using FINPACK's FINFLO feature to evaluate their financial standing at the end of the simulation. FINFLO takes information given in the balance sheet and uses it as the year one beginning balance sheet. After the user enters factors including the cropping mix for the year, sale price, and yield, FINFLO takes information from the budgets to make the necessary calculations. Finally, FINFLO combines the information it is given and the calculations of cash inflows and outflows based on the budgets to generate an ending balance sheet for the year. This ending balance sheet is used as the beginning balance sheet for the next year.

Next, the simulations are run again imposing a two-year period of price shocks using crop and cattle prices from market reports on January 12, 2018, *ceteris paribus*. The prices for years one and two are amended to reflect the January 12th prices, with the prices in years three through 10 remaining at the 10-year average level. The prices in years one and two are changed to $3.58 per bushel for wheat, $8.78 per bushel for

soybeans, $3.32 per bushel for corn (USDA NASS 2018), and $146.31 per hundredweight for cattle (Market Report 2018 (USDA AMS data)).

Finally, a four-year period of price shocks was imposed using crop and cattle prices from market reports on January 12, 2018, *ceteris paribus.* The prices for years one through four are amended to reflect the January 12th prices, with the prices in years five through 10 remaining at the 10-year average level. At the end of the 10-year simulations, measures of liquidity, solvency, profitability, and debt repayment capacity are evaluated to better understand the causes, nature, and potential extent of farm financial stress, and more importantly, what factors most influence farm financial performance. The main focus of these financial measures was the debt-to-asset ratio following Jolly et al. (1985).

In evaluating the results of the baseline simulations, any crop and diversified farm scenarios where the year 10 debt-to-asset ratio is greater than the year one debt-to-asset ratio is re-evaluated under six different management scenarios, and any cow-calf farm scenarios where the year 10 debt-to-asset ratio is greater than the year one debt-to-asset ratio is re-evaluated under four different management scenarios, adapting the work of Doye and Jolly (1987), and Zhang and Tidgren (2018). Each of the six management scenarios represented a management decision or strategy that could be easily made and implemented by a farm manager as a means to lessen the effects of farm financial stress.

Management Scenario One

The first management scenario was used to evaluate the role input costs play in financial stress. To create this scenario, new budgets were created for each of the three enterprises. A 10 percent cut to input costs was imposed to each of the farms. On the crop farm, original direct expenses were $151.06 per acre for soybeans, $225.00 per acre for

corn, and $210.00 per acre for wheat. Total direct expenses were $517.22 per head for the cow-calf farm. Total original direct expenses on the diversified farm combine the direct expenses of the crop farm and cow-calf farm. New direct expenses are $135.96 per acre for soybeans, $202.50 per acre for corn, and $188.01 per acre for wheat. Total new direct expenses were $465.49 per head for the cow-calf farm. Total new direct expenses on the diversified farm combine the direct expenses of the crop farm and cow-calf farm.

Management Scenario Two

The second management scenario involved changing the cropping patterns and selling a portion of owned land and leasing it back. The crop farm planted all their 444 acres to wheat instead of planting multiple crops for all 10 years of the simulation. The cow-calf farm sells one-quarter of their pastureland at the current market rate of $1,969 per acre (OSU 2018), then leases it back at a rate of $11.75 per acre (USDA NASS 2017e). The diversified farm changed their cropping pattern, planting all their 444 acres to wheat instead of planting multiple crops for all 10 years of the simulation and sells one-quarter of their pastureland at the current market rate of $1,969 per acre (OSU 2018), then leased it back at a rate of $11.75 per acre (USDA NASS 2017e). The crop farm did not sell any of its owned land.

Management Scenario Three

The third management scenario also involved changing the cropping patterns and selling a portion of owned land and leasing it back. The crop farm planted a 50/50 mix of wheat and soybeans (222 acres of wheat and 222 acres of soybeans). The cow-calf farm sold one-half of their pastureland at the current market rate of $1,969 per acre (OSU 2018), then leased it back at a rate of $11.75 per acre (USDA NASS 2017e). The

diversified farm changed their cropping pattern, planting 222 acres to wheat and 222 acres to soybeans for all 10 years of the simulation, and sold one-half of their pastureland at the current market rate of $1,969 per acre (OSU 2018), then leased it back at a rate of $11.75 per acre (USDA NASS 2017e). The crop farm did not sell any of its owned land.

Management Scenario Four

The fourth management scenario only applied to the crop farm and the diversified farm. The crop farm planted all their 444 acres to wheat for years one and two of the simulation and returned to planting an even mix of all three crops in years three through 10 of the simulation. The diversified farm changed their cropping pattern, planting all their 444 acres to wheat for years one and two of the simulation and return to planting an even mix of all three crops in years three through 10 of the simulation, and sold one-quarter of their pastureland at the current market rate of $1,969 per acre (OSU 2018), then leased it back at a rate of $11.75 per acre (USDA NASS 2017e). The crop farm did not sell any of its owned land.

Management Scenario Five

The fifth management scenario also only applied to the crop farm and the diversified farm. The crop farm planted a 50/50 mix of wheat and soybeans (222 acres of wheat and 222 acres of soybeans) for years one and two of the simulation and returned to planting an even mix of all three crops in years three through 10 of the simulation. The diversified farm changed their cropping pattern, planting a 50/50 mix of wheat and soybeans (222 acres of wheat and 222 acres of soybeans) for years one and two of the simulation and return to planting an even mix of all three crops in years three through 10 of the simulation, and sold one-half of their pastureland at the current market rate of

$1,969 per acre (OSU 2018), then leased it back at a rate of $11.75 per acre (USDA NASS 2017e). The crop farm did not sell any of its owned land.

Management Scenario Six

Management scenario six is an asset management scenario. In this scenario machinery is sold off and replaced at a rate of 10 percent per year. The goal of this management scenario is to smooth the cash flow effects of a wholesale replacement of machinery and vehicles in year five from the baseline scenario. The farm operator takes out a new machinery loan in year five for 50 percent of the total value of the machinery compliment (since they have already "replaced" 50 percent of the machinery). When the new machinery loan is taken out, the interest rate is increased to 5.75 percent, this assumes that the interest rate increases a ½ percentage point per year. In this scenario, trucks and other vehicles are not replaced.

The total value of machinery on the crop farm is $327,473, making the annual replacement value $32,747.30 per year. The value of the new loan in year five was $163,736.50. On the cow-calf farm, the total value of machinery is $9,387, making the annual replacement value $938.70 per year. The value of the new loan in year five was $4,693.50. The total value of machinery on the diversified farm is $336,860, making the annual replacement value $33,686 per year. The value of the new loan in year five was $168,430.

Since machinery is being kept on farm longer, the cost of repairs and maintenance was assumed to be explicitly increased $500.00 per year for each piece of machinery and vehicle. The crop farm and cow-calf farm both utilized four pieces, making their annual cost of repairs and maintenance increased by $2,000 per year in this scenario. The

diversified farm held seven pieces of equipment making their annual cost of repairs and maintenance increased by $3,500 per year.

Simulation Results

The results from all simulations were evaluated using the same set of criteria taken from Doye (2014). The liquidity measure (current ratio) was be considered green zone if it was greater than or equal to 2.0, yellow zone if the current ratio was 1.1 to 1.9, and red zone if the current ratio was less than or equal to 1.0. The debt-to-asset ratio (solvency measure) was be considered green zone if it was less than or equal to 30 percent, yellow zone if the debt-to-asset ratio was 31 percent to 59 percent, and red zone if the debt-to-asset ratio was greater than or equal to 60 percent.

Adapting the research of Doye and Jolly (1987), if a farm reached greater than or equal to a 100 percent debt-to-asset ratio at any time during the simulation, they were considered "technically insolvent" (Doye and Jolly 1987). However, these farms remained in consideration because if the farm operator was able to secure external cash to cover term debts, the possibility existed that they would weather a period of insolvency. In analyzing the results, a farm was be considered "financially stressed" when the debt-to-asset ratio was greater than or equal to 40 percent (Jolly et al. 1985; Doye 2014; Burns, Tulman, and Harris 2015).

Farm profitability is evaluated using the rate of return on equity. Profitability will be considered "good"/green zone if it is greater than or equal to 10 percent, "fair"/yellow zone if the rate of return on equity is 5.1 percent to 9.9 percent, and "poor"/red zone if the rate of return on equity is less than or equal to 5 percent. Finally, debt repayment capacity will be considered green zone if the term debt coverage ratio was greater than or equal to

1.35, yellow zone if the term debt coverage ratio was 1.11 to 1.34, red zone if it was less than or equal to 1.10. After imposing the management scenarios, the financial measures of all simulations were compared. The debt-to-asset ratio was the main focus of the financial ratios and its change from year one to year 10 was evaluated.

Expectations

Based on the objectives of this study, the expectations of this research are:

1. Sustained low commodity prices will increase the degree of financial stress.
2. Farms that carry a greater amount of debt will be less likely to reduce their degree of financial stress in the 10-year simulation.
3. Farms that include a livestock component will have a lower degree of financial stress through periods of low commodity output prices.
4. Management strategies exist that will be successful in moving a farm business through a period of financial stress.

The results of this study will be compared to these expectations to evaluate what factors are most influential in managing farm financial stress.

CHAPTER IV

RESULTS

Baseline Scenarios

The three sets of baseline scenarios are used to establish a foundation for these "average" farms. The first baseline scenario used the 10-year average prices and three-year average yields for all 10 years of the simulations.

Baseline Scenario Crop Farm

For the baseline crop farm, liquidity concerns were constantly present in the medium and high leverage cases (table 4.1). The medium leverage farm did reach yellow zone liquidity in years five through seven, with a high of 1.6 in year six. The situation is more variable when solvency is evaluated. The low leverage crop farm had a debt-to-asset ratio of zero percent by year 10, with a temporary high of 34.3 percent in year five. The medium and low leverage farms both end the simulation more solvent than they began, with the debt-to-asset ratio decreasing 27.4 percentage points in the medium leverage case and 12 percentage points in the low leverage case. However, the high leverage farm becomes technically insolvent in year six. As a result, the high leverage farm was simulated using the parameters defined in the six management scenarios. The crop farm had yellow zone profitability for five and seven years in the low and medium leverage cases respectively. The high leverage farm had three years of green zone profitability, with a high of 28.1 percent in year four, but the remaining years were in the

red zone. The crop farm's repayment capacity was the most variable. The low and medium leverage farms each had four years of green zone debt repayment. The high leverage scenario had only one year of green zone debt repayment capacity.

Baseline Scenario Cow-Calf Farm

The liquidity of the cow-calf farm was like that of the crop farm except that the medium leverage farm did not have any years of green or yellow zone liquidity (table 4.2). Over the ten years of the simulation, the solvency of the low and medium leverage farms improved 10 percentage points, and 16.4 percentage points respectively. The low leverage farm ended with a zero percent debt-to-asset ratio and the medium leverage farm ended 16.4 percentage points lower by year 10. However, the debt-to-asset ratio of the high leverage farm increased 4.5 percentage points. As a result, the high leverage farm was simulated using the parameters defined in the six management scenarios. No leverage position reached technical insolvency in the simulation. The cow-calf operation had profitability issues at each leverage position. The low and high leverage farms each had one year of green zone profitability, and the medium leverage farm had two years. This could be due to the markedly higher value of the assets owned by the cow-calf farm as compared to the crop farm. The cow-calf farm's debt repayment capacity was just as variable as the crop farm. The low leverage farm had eight years of green zone repayment capacity, the medium leverage farm had five years, but the high leverage farm had zero years of green or yellow zone repayment capacity.

Baseline Scenario Diversified Farm

The diversified farm showed better results than the previous two farms (table 4.3). The diversified farm combined the crop and cow-calf operations, giving the diversified

farm a larger asset base on which to operate. There were no liquidity issues in the low leverage scenario (the year one current ratio is in the yellow zone), and serious liquidity issues in the medium and high leverage cases, with all 10 years being in the red zone for both cases. The solvency of low and medium leverage scenarios improved 7.5 percent and 18.8 percent from beginning to end respectively. The low leverage farm decreased its debt-to-asset ratio by 7.5 percentage points and the medium leverage farm decreased 18.8 percentage points. However the high leverage farm had a year 10 debt-to-asset ratio 4.1 percentage points higher than year one. As a result, the high leverage farm was simulated using the parameters defined in the six management scenarios. No leverage position reached technical insolvency in the simulation. The low and medium leverage farms had yellow zone profitability all ten years of the simulation (the year one rate of return on equity for the medium leverage farm was in the green zone). The high leverage farm had yellow zone profitability three out of ten years with the remaining seven being in the red zone. The repayment capacity of the farm was in the green zone beginning in year three for the low leverage scenario. The medium leverage farm had two years of green zone repayment capacity and five years of yellow zone repayment capacity. The high leverage case never had any green or yellow zone repayment capacity.

Two-Year Price Shock Scenarios

The second baseline scenario imposed the prices from January 12, 2018 on each example farm during years 1 and 2, then returned to the 10-year average price in years 3 through 10.

Table 4.1: Baseline Scenario Crop Farm Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Low Leverage	**Current Ratio**	0.3	7.3	15.6	20.5	4.1	3.6	3.2	2.7	2.6	n/a
	D/A Ratio	12.0%	2.4%	1.6%	0.9%	34.3%	29.8%	24.3%	17.5%	9.1%	0.0%
	Rate of Return on Equity	3.6%	9.6%	5.7%	6.3%	3.4%	2.9%	4.0%	5.0%	5.8%	6.5%
	Term Debt Coverage Ratio	1.02	13.07	8.76	8.88	4.32	0.70	0.70	0.70	0.70	0.77
Medium Leverage	**Current Ratio**	0.2	0.2	0.3	0.4	1.1	1.6	1.1	0.7	0.4	0.8
	D/A Ratio	39.9%	35.9%	30.8%	24.6%	52.6%	41.1%	35.5%	27.8%	19.8%	12.5%
	Rate of Return on Equity	4.6%	6.5%	7.7%	8.8%	4.6%	17.6%	5.2%	6.5%	7.6%	8.4%
	Term Debt Coverage Ratio	1.21	0.57	6.52	7.11	3.87	1.36	0.64	0.64	0.63	0.66
High Leverage	**Current Ratio**	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	87.2%	88.5%	89.4%	89.7%	99.5%	103.0%	106.1%	108.9%	111.3%	113.4%
	Rate of Return on Equity	1.5%	10.9%	19.3%	28.1%	-3.2%	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	0.50	0.50	0.47	0.45	1.72	0.48	0.45	0.42	0.40	0.39

Table 4.2: Baseline Scenario Cow-Calf Farm Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Low Leverage	**Current Ratio**	1.1	7.7	10.7	12.9	12.0	13.3	14.4	15.3	16.0	n/a
	D/A Ratio	10.0%	2.2%	1.5%	0.7%	5.1%	4.0%	3.0%	2.0%	1.0%	0.0%
	Rate of Return on Equity	8.3%	10.4%	8.3%	8.2%	7.5%	7.2%	7.0%	6.9%	6.7%	6.6%
	Term Debt Coverage Ratio	1.07	1.16	6.76	7.13	7.16	4.33	4.38	4.38	4.38	4.38
Medium Leverage	**Current Ratio**	0.8	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	D/A Ratio	34.6%	30.4%	28.6%	26.7%	28.5%	25.2%	23.5%	21.8%	20.0%	18.2%
	Rate of Return on Equity	10.5%	9.4%	9.4%	9.3%	8.5%	10.4%	8.0%	7.9%	7.9%	7.8%
	Term Debt Coverage Ratio	1.03	0.65	0.69	0.65	2.80	2.27	1.66	1.65	1.64	1.63
High Leverage	**Current Ratio**	0.7	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.1%	65.0%	65.3%	65.5%	67.3%	67.9%	68.3%	68.8%	69.2%	69.6%
	Rate of Return on Equity	12.7%	9.1%	9.4%	9.7%	8.6%	8.4%	8.7%	9.0%	9.2%	9.4%
	Term Debt Coverage Ratio	0.74	0.56	0.52	0.48	0.51	0.41	0.37	0.75	0.74	0.69

Table 4.3: Baseline Scenario Diversified Farm Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Low Leverage	**Current Ratio**	1.1	2.1	3.7	5.0	5.0	5.4	5.8	6.2	7.0	25.3
	D/A Ratio	8.3%	4.3%	3.2%	2.1%	11.2%	9.1%	7.0%	4.9%	2.8%	0.8%
	Rate of Return on Equity	7.5%	6.6%	6.8%	6.8%	5.9%	5.6%	5.6%	5.7%	5.6%	5.6%
	Term Debt Coverage Ratio	1.04	1.08	5.00	5.19	4.35	2.21	2.24	2.24	2.24	2.45
Medium Leverage	**Current Ratio**	0.5	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4
	D/A Ratio	29.6%	27.1%	25.3%	22.3%	26.9%	24.1%	21.0%	17.8%	14.4%	10.8%
	Rate of Return on Equity	10.3%	6.9%	7.1%	7.3%	6.3%	6.2%	6.4%	6.5%	6.6%	6.7%
	Term Debt Coverage Ratio	1.15	0.60	0.88	1.07	2.72	1.29	1.29	1.28	1.28	1.35
High Leverage	**Current Ratio**	0.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	63.5%	63.4%	63.4%	63.2%	67.0%	67.3%	67.6%	67.7%	67.7%	67.6%
	Rate of Return on Equity	4.6%	3.9%	4.5%	5.0%	3.3%	3.4%	4.1%	4.6%	5.1%	5.6%
	Term Debt Coverage Ratio	0.69	0.60	0.58	0.55	0.70	0.51	0.48	0.68	0.66	0.66

Two-Year Price Shock Crop Farm

When the two years of price shocks were applied to the crop farm, the results were in general financially worse than the base scenario (table 4.4). Only one year of green zone liquidity existed with no green zone current ratios in the medium and high leverage cases. A 35 percentage point increase in the debt-to-asset ratio occurred between years four and five (the year of equipment replacement) for the low leverage farm, but it ended the simulation with a 0 percent debt-to-asset ratio. Similarly, in the medium leverage farm, a 17 percentage point increase was observed between years four and five, with the debt-to-asset ratio ending lower than in year one, however still above the "financially stressed" threshold. The debt-to-asset ratio for the high leverage case was 94.9 percent at the end of year one, and reached technical insolvency by year two. As a result, the high leverage farm was simulated using the parameters defined in the six management scenarios.

Profitability in the low leverage case only achieved a yellow zone position, the medium leverage farm had three years of green zone profitability, and the high leverage case had one year. Inadequate debt repayment capacity existed at all leverage positions. The low leverage case had four years where debt obligations could be met comfortably by internal cash flow. The highest term debt coverage ratio was 8.28 in year four meaning the farm could service over 800 percent of its term debt with internal cash flow. The medium leverage farm had three years of green zone and one year of yellow zone repayment capacity. The high leverage farm had only one year in which debt obligations can be met by internal cash flow with the other nine years being in the red zone.

Two-Year Price Shock Cow-Calf Farm

Liquidity of the cow-calf farm was marginally better than the crop farm in the low and medium leverage positions (table 4.5). The low leverage case had eight years of green zone liquidity. Solvency for the low leverage case ended the simulation with a 0 percent debt-to-asset ratio. The medium leverage case ended with a 15.5 percentage point lower debt-to-asset ratio, and the high leverage simulation ends with a higher ratio than the first year, but did not reach technical insolvency. As a result, the high leverage farm was simulated using the parameters defined in the management scenarios. At each leverage position, there was one year of green zone profitability with the remaining nine years being in the yellow zone. The low leverage farm had strong repayment capacity starting in year three, medium leverage starting in year five, and high leverage never showed a repayment capacity in the green or yellow zone.

Two-Year Price Shock Diversified Farm

The diversified farm's liquidity mirrored that of the cow-calf farm (table 4.6). The low leverage case showed seven years of green zone liquidity and one year of yellow zone liquidity. Both the medium and high leverage cases were in the red zone for all 10 years. The low and medium leverage cases improved their solvency from year one to year 10. The solvency of the high leverage case increased from 65 percent in year one to 72.5 percent in year 10, an increase of 7.5 percentage points. As a result, the high leverage farm was simulated using the parameters defined in the management scenarios. Profitability for each leverage case never reached a green zone position, but the low and medium leverage cases each had nine years of yellow zone profitability while the high leverage case only had two years of yellow zone profitability with the remaining eight

years being in the red zone. The low leverage case showed eight years of green zone repayment capacity, the medium leverage case showed one year of green zone and five years of yellow zone repayment capacity, and the high leverage case had no years of green or yellow zone repayment capacity.

Four-Year Price Shock Scenario

The third baseline scenario imposed the prices from January 12, 2018 on each product during years 1 through 4, then returned to the 10-year average price in years 5 through 10.

Four-Year Price Shock Crop Farm

In the four-year price shock scenario, the outlook for the crop farm was bleak (table 4.7). No current ratio existed that is outside the red zone. The solvency of the business deteriorated in each leverage case. The debt-to-asset ratio ended three percentage points higher in the low leverage case, 20 percentage points higher in the medium leverage case, and 73 percentage points higher for the high leverage case. The high leverage farm reached technical insolvency in year two. As a result, all three leverage cases were simulated using the parameters defined in the management scenarios. The low leverage case showed four years of yellow zone profitability, and the medium leverage farm had three years of green zone profitability, but large negative returns on equity ratios existed in each leverage case. The same situation existed for debt repayment capacity. The low leverage case had one year of green zone repayment capacity while the medium and high leverage cases only had one year of yellow zone repayment capacity at

best. For each leverage case, the farm would be forced to borrow money to cover other debt obligations.

Four-Year Price Shock Cow-Calf Farm

The cow-calf farm presents a different picture, most likely because the current price for cattle was not considerably lower than the ten-year average price (table 4.8). The low leverage case had a green zone current ratio each year except the first, but the medium and high leverage cases never had a current ratio outside the red zone. Solvency improved 10.1 percentage points in the low leverage case, 14.8 percentage points in the medium leverage case, but deteriorated by 5.8 percentage points in the high leverage case. As a result, the high leverage farm was simulated using the parameters defined in the management scenarios. The profitability picture was positive in each leverage case. Each leverage position experienced one year of green zone profitability, with the remaining nine years being in the yellow zone. Debt repayment capacity was in the green zone for eight years in the low leverage case and six years in the medium leverage case (with one year of yellow zone repayment capacity in the low leverage case). The high leverage simulation continually had red zone debt repayment capacity.

Four-Year Price Shock Diversified Farm

The results from the diversified farm resembled those of the cow-calf farm from above (table 4.9). The low leverage case had six years of green zone current ratios and one year with a yellow zone current ratio. Liquidity in the medium and high leverage cases was persistently in the red zone. Solvency improved 7.6 percentage points in the low leverage case and 9.7 percentage points in the medium leverage case, but increased 11.8 percentage points in the high leverage case. As a result, the high leverage farm was

Table 4.4: Crop Farm, Two-Year Price Shock Scenario Simulation Results

Years		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Low Leverage	**Current Ratio**	0.2	0.2	0.4	1.0	2.2	1.8	1.4	1.0	0.8	n/a
	D/A Ratio	19.9%	18.0%	11.6%	3.9%	39.1%	34.4%	28.3%	20.6%	11.0%	0.0%
	Rate of Return on Equity	-5.7%	0.6%	6.0%	7.1%	3.9%	3.6%	4.9%	6.1%	7.0%	7.7%
	Term Debt Coverage Ratio	0.35	3.68	7.94	8.28	4.19	0.70	0.70	0.70	0.69	0.75
Medium Leverage	**Current Ratio**	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.1	0.2
	D/A Ratio	48.0%	53.4%	50.3%	46.2%	63.4%	54.0%	51.9%	48.9%	45.2%	40.6%
	Rate of Return on Equity	-9.4%	-9.5%	8.8%	10.4%	4.6%	24.3%	6.0%	7.6%	8.9%	10.0%
	Term Debt Coverage Ratio	0.54	-0.13	5.74	6.26	3.24	1.32	0.59	0.56	0.54	0.56
High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	94.9%	105.3%	108.1%	110.4%	116.4%	121.9%	127.2%	132.3%	137.3%	142.0%
	Rate of Return on Equity	-71.5%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.10	-0.13	0.41	0.38	1.46	0.41	0.38	0.35	0.31	0.30

Table 4.5: Cow-Calf Farm, Two-Year Price Shock Scenario Simulation Results

Years		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Low Leverage	**Current Ratio**	1.0	6.5	9.5	11.8	11.2	12.5	13.6	14.5	15.3	n/a
	D/A Ratio	10.1%	2.2%	1.5%	0.7%	5.1%	4.0%	3.0%	2.0%	1.0%	0.0%
	Rate of Return on Equity	7.7%	10.2%	8.4%	8.2%	7.6%	7.2%	7.1%	6.9%	6.8%	6.6%
	Term Debt Coverage Ratio	1.00	1.12	6.73	7.11	7.15	4.33	4.38	4.38	4.38	4.38
Medium Leverage	**Current Ratio**	0.7	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	D/A Ratio	34.8%	31.3%	29.5%	27.6%	29.4%	26.1%	24.5%	22.8%	21.1%	19.3%
	Rate of Return on Equity	9.6%	9.1%	9.4%	9.3%	8.5%	10.5%	8.0%	8.0%	7.9%	7.8%
	Term Debt Coverage Ratio	0.96	0.61	0.68	0.65	2.78	2.26	1.64	1.63	1.62	1.61
High Leverage	**Current Ratio**	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.4%	65.8%	66.1%	66.3%	68.2%	68.7%	69.2%	69.7%	70.2%	70.6%
	Rate of Return on Equity	11.3%	8.5%	9.5%	9.8%	8.7%	8.5%	8.9%	9.1%	9.4%	9.5%
	Term Debt Coverage Ratio	0.68	0.53	0.51	0.48	0.51	0.41	0.36	0.74	0.72	0.68

Table 4.6: Diversified Farm, Two-Year Price Shock Scenario Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Low Leverage	**Current Ratio**	0.7	0.5	1.7	3.2	3.8	4.3	4.7	5.1	5.9	21.5
	D/A Ratio	8.5%	5.4%	3.3%	2.2%	11.6%	9.5%	7.3%	5.1%	2.9%	0.8%
	Rate of Return on Equity	5.4%	4.8%	6.9%	7.0%	6.1%	5.8%	5.9%	5.9%	5.8%	5.8%
	Term Debt Coverage Ratio	0.76	0.66	4.88	5.15	4.35	2.21	2.24	2.24	2.24	2.45
Medium Leverage	**Current Ratio**	0.3	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	D/A Ratio	30.7%	31.1%	29.5%	26.7%	31.2%	28.6%	25.8%	22.8%	19.6%	16.3%
	Rate of Return on Equity	7.4%	4.4%	7.3%	7.4%	6.4%	6.3%	6.5%	6.6%	6.7%	6.8%
	Term Debt Coverage Ratio	0.90	0.35	0.84	1.03	2.62	1.24	1.23	1.23	1.23	1.28
High Leverage	**Current Ratio**	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.0%	66.8%	66.9%	67.0%	70.7%	71.3%	71.8%	72.1%	72.4%	72.5%
	Rate of Return on Equity	-0.1%	-0.7%	4.4%	5.0%	3.2%	3.2%	3.9%	4.6%	5.2%	5.7%
	Term Debt Coverage Ratio	0.49	0.41	0.56	0.53	0.68	0.49	0.46	0.64	0.62	0.61

simulated using the parameters defined in the management scenarios. Profitability was in the yellow zone for eight years in the low leverage case, seven years in the medium leverage farm and two years in the high leverage run. Debt repayment capacity was green zone for eight years in the low leverage case and one year in the medium leverage case (with five years of yellow zone repayment capacity in the medium leverage case). The high leverage simulation continually had red zone debt repayment capacity.

Pre-Management Scenarios Summary

In total 11 of the baseline farm cases were put through the management scenario simulations, recall, management scenario simulations were conducted if the farm had a greater debt-to-asset ratio in year 10 than it had in year one. Specifically, farm that met this criteria included: high leverage baseline crop farm, high leverage baseline cow-calf farm, high leverage baseline diversified farm, high leverage two-year price shock crop farm, high leverage two-year price shock cow-calf farm, high leverage two-year price shock diversified farm, low leverage four-year price shock crop farm, medium leverage four-year price shock crop farm, high leverage four-year price shock crop farm, high leverage four-year price shock cow-calf farm, and the high leverage four-year price shock diversified farm.

Table 4.7: Crop Farm, Four-Year Price Shock Scenario Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Low Leverage	**Current Ratio**	0.2	0.2	0.2	0.2	0.4	0.3	0.2	0.2	0.1	0.2
	D/A Ratio	19.9%	18.0%	20.5%	23.2%	45.2%	42.4%	38.9%	34.5%	29.2%	22.9%
	Rate of Return on Equity	-5.7%	0.6%	-4.4%	-4.0%	3.7%	4.1%	5.6%	6.8%	7.9%	8.8%
	Term Debt Coverage Ratio	0.35	3.68	-1.26	-1.38	3.75	0.67	0.66	0.64	0.62	0.66
Medium Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	48.0%	53.4%	59.3%	65.7%	78.9%	71.5%	71.5%	71.0%	69.8%	67.9%
	Rate of Return on Equity	-9.4%	-9.5%	-10.5%	-11.7%	5.5%	36.8%	6.2%	9.0%	11.6%	14.1%
	Term Debt Coverage Ratio	0.54	-0.13	-1.83	-2.06	0.56	1.21	0.47	0.44	0.45	4.90
High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	94.9%	105.3%	116.7%	129.0%	131.6%	138.8%	146.1%	153.4%	160.6%	167.8%
	Rate of Return on Equity	-71.5%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.10	-0.13	-0.18	-0.24	1.22	0.34	0.31	0.28	0.24	0.22

Table 4.8: Cow-Calf Farm, Four-Year Price Shock Scenario Simulation Results

Years		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Low Leverage	**Current Ratio**	1.0	6.5	9.1	11.0	10.7	12.0	13.1	14.1	14.9	n/a
	D/A Ratio	10.1%	2.2%	1.5%	0.8%	5.1%	4.1%	3.0%	2.0%	1.0%	0.0%
	Rate of Return on Equity	7.7%	10.2%	8.1%	8.0%	7.6%	7.2%	7.1%	7.0%	6.8%	6.7%
	Term Debt Coverage Ratio	1.00	1.12	6.40	6.75	7.15	4.33	4.38	4.38	4.38	4.38
Medium Leverage	**Current Ratio**	0.7	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	D/A Ratio	34.8%	31.3%	29.8%	28.2%	30.0%	26.7%	25.1%	23.5%	21.7%	20.0%
	Rate of Return on Equity	9.6%	9.1%	9.1%	9.0%	8.6%	10.5%	8.0%	8.0%	7.9%	7.8%
	Term Debt Coverage Ratio	0.96	0.61	0.65	0.61	2.76	2.25	1.63	1.62	1.61	1.60
High Leverage	**Current Ratio**	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.4%	65.8%	66.3%	66.8%	68.7%	69.3%	69.8%	70.3%	70.7%	71.2%
	Rate of Return on Equity	11.3%	8.5%	8.8%	9.1%	8.8%	8.6%	8.9%	9.2%	9.4%	9.6%
	Term Debt Coverage Ratio	0.68	0.53	0.49	0.45	0.50	0.40	0.36	0.73	0.72	0.67

Table 4.9: Diversified Farm, Four-Year Price Shock Scenario Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Low Leverage	**Current Ratio**	0.7	0.5	0.9	1.5	2.7	3.2	3.7	4.1	4.8	18.0
	D/A Ratio	8.5%	5.4%	3.4%	2.3%	12.0%	9.8%	7.5%	5.2%	3.0%	0.9%
	Rate of Return on Equity	5.4%	4.8%	5.0%	5.2%	6.3%	6.0%	6.1%	6.1%	6.0%	6.0%
	Term Debt Coverage Ratio	0.76	0.66	3.38	3.57	4.31	2.21	2.24	2.24	2.24	2.45
Medium Leverage	**Current Ratio**	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0. 1	0.1	0.1
	D/A Ratio	30.7%	31.1%	31.4%	30.6%	34.9%	32.5%	29.9%	27.1%	24.1%	21.0%
	Rate of Return on Equity	7.4%	4.4%	4.6%	4.9%	6.4%	6.4%	6.6%	6.7%	6.9%	6.9%
	Term Debt Coverage Ratio	0.90	0.35	0.49	0.66	2.53	1.20	1.19	1.18	1.18	1.23
High Leverage	**Current Ratio**	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.0%	66.8%	68.5%	70.3%	74.0%	74.7%	75.4%	75.9%	76.4%	76.8%
	Rate of Return on Equity	-0.1%	-0.7%	-0.4%	-0.1%	3.0%	3.0%	3.8%	4.6%	5.2%	5.9%
	Term Debt Coverage Ratio	0.49	0.41	0.37	0.33	0.65	0.47	0.44	0.61	0.59	0.57

Management Scenario One

The first management scenario evaluated the impact of trimming production costs. Overall input costs were cut by 10 percent for each crop and livestock production activity.

Baseline Farms

The liquidity for the three tested farms did not change from the original simulation (table 4.10). The two most impactful results from the first management scenario were in the areas of solvency and profitability. In the original baseline simulation, the high leverage crop farm's debt-to-asset ratio increased 26 percentage points and the farm became technically insolvent in year six. Under management scenario one, the debt-to-asset ratio of the high leverage crop farm only increased 4.7 percentage points and the farm did not become technically insolvent. The debt-to-asset ratio of the high leverage cow-calf farm increased 3.7 percentage points and the high leverage diversified farm increased 1.5 percentage points. Both increases were smaller when compared to the original baseline simulation. The profitability of the high leverage crop farm had 10 years of green zone rate of returns on equity compared to one year in the baseline. The high leverage diversified farm also improved from three years of yellow zone profitability in the original baseline to six years of yellow zone profitability in management scenario one. There was no effect on debt repayment capacity.

Two-Year Price Shock Farms

The impact of the first management scenario when applied to the farms under a two year price shock is minor (table 4.11). The liquidity for the three tested farms did not

change from the original simulation. The highly leveraged crop farm showed a debt-to-asset ratio increase of 25.6 percentage points and still became technically insolvent in year two. The high leverage cow-calf farm and diversified farm both ended with better debt-to-asset ratios when compared to the original baseline simulations, but were still in a red zone solvency position. The profitability results are mixed. The profitability of the high leverage crop farm shows no change from the original baseline, while the profitability of the high leverage cow-calf farm shows two years of green zone profitability and eight years of yellow zone profitability, compared to one year of green zone and nine years of yellow zone profitability in the original simulation. The high leverage diversified farm also had marginally improved profitability moving from two years of yellow zone return on equity in the original runs to five years in this management scenario. Debt repayment capacity worsened for the high leverage crop farm and remained unchanged for the cow-calf farm and the diversified farm.

Four-Year Price Shock Farms

Results for the four-year price shock farms under this management scenario were varied (table 4.12). The low leverage crop farm improved its performance in every financial measure. Liquidity for the other four cases showed no change. The solvency of the low leverage crop farm declined 18.4 percentage points and the medium leverage crop farm declined 2.3 percentage points. The debt-to-asset ratios of the remaining three farms did not improve. The high leverage crop farm ended with a 144.8 percent debt-to-asset ratio, the cow-calf farm's debt-to-asset ratio increased 4.9 percentage points and the diversified farm's debt-to-asset ratio increased 9.1 percentage points. The high leverage crop farm became technically insolvent in year two. The medium leverage crop farm

added one year of green zone profitability, and the profitability of the high leverage diversified farm added one yellow zone year. Debt repayment capacity remains unchanged for all farms.

Management Scenario Two

Management scenario two evaluated how a change in cropping pattern and/or a sell off of real estate impacts the various farms. The crop and diversified farms planted all 444 acres to wheat for all 10 years of the simulation. The cow-calf and diversified farms sold 111 acres of pastureland and leased it back.

Baseline Farms

This management scenario produced disastrous results for the crop farm and diversified farm, but the cow-calf farm experienced a small improvement (table 4.13). The crop farm was the most affected in this scenario. Liquidity reached zero in year five, the debt-to-asset ratio increased by 231.7 percentage points to 333.1 percent by year 10, the farm became technically insolvent by the end of year one, and never had a positive term debt coverage ratio. The diversified farm experienced one year of yellow zone liquidity, but his was most likely due to the cash infusion that comes from the sale of pasture land in year one rather than improved performance. The debt-to-asset ratio increased 31.7 percentage points in this scenario compared to 4.1 percentage points in the original baseline. Both profitability and debt repayment patterns remained unchanged. The cow-calf farm benefited the most of the three farm types. The farm had green zone liquidity in year one and yellow zone liquidity the next year, but the remaining eight

Table 4.10: Management Scenario One, Baseline Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	85.7%	85.3%	84.1%	82.1%	91.9%	93.0%	93.5%	93.2%	92.2%	90.4%
	Rate of Return on Equity	11.3%	20.3%	25.7%	29.2%	14.0%	21.2%	36.9%	51.4%	60.0%	61.3%
	Term Debt Coverage Ratio	0.61	0.62	0.60	0.58	2.27	0.62	0.61	0.59	0.57	0.58
Cow-Calf High Leverage	**Current Ratio**	0.7	0.3	0.2	0.2	0.1	0.1	0.1	0. 1	0.1	0.1
	D/A Ratio	65.0%	64.9%	65.0%	65.1%	66.9%	67.3%	67.7%	68.1%	68.4%	68.7%
	Rate of Return on Equity	13.0%	9.3%	9.6%	9.8%	8.8%	8.6%	8.9%	9.1%	9.3%	9.5%
	Term Debt Coverage Ratio	0.75	0.56	0.53	0.49	0.52	0.42	0.38	0.78	0.77	0.73
Div. High Leverage	**Current Ratio**	0.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	63.3%	62.9%	62.6%	62.6%	65.8%	65.8%	65.7%	65.5%	65.2%	64.8%
	Rate of Return on Equity	5.2%	4.5%	5.1%	5.6%	4.0%	4.1%	4.7%	5.3%	5.8%	6.2%
	Term Debt Coverage Ratio	0.72	0.63	0.61	0.58	0.75	0.55	0.52	0.74	0.72	0.72

Table 4.11: Management Scenario One, Two-Year Price Shock Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	93.4%	102.1%	102.8%	102.8%	108.8%	111.9%	114.5%	116.6%	118.1%	119.0%
	Rate of Return on Equity	-53.5%	-227.7%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	0.02	-0.01	0.54	0.52	0.69	0.55	0.53	0.51	0.48	0.49
Cow-Calf High Leverage	**Current Ratio**	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0. 1	0.1	0.1
	D/A Ratio	65.4%	65.6%	65.8%	65.9%	67.7%	68.2%	68.6%	69.0%	69.3%	69.7%
	Rate of Return on Equity	11.6%	8.7%	9.7%	10.0%	8.9%	8.7%	9.0%	9.3%	9.5%	9.6%
	Term Debt Coverage Ratio	0.69	0.53	0.52	0.49	0.52	0.42	0.38	0.77	0.75	0.71
Div. High Leverage	**Current Ratio**	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	64.8%	66.3%	66.2%	66.0%	69.5%	69.8%	69.9%	69.9%	69.8%	69.7%
	Rate of Return on Equity	0.6%	0.0%	5.1%	5.7%	3.9%	4.0%	4.7%	5.3%	5.9%	6.4%
	Term Debt Coverage Ratio	0.52	0.44	0.59	0.56	0.72	0.53	0.49	0.70	0.68	0.68

Table 4.12: Management Scenario One, Four-Year Price Shock Farms Simulation Results

Years ->		1	2	3	4	5	6	7	8	9	10
Crop Low Leverage	**Current Ratio**	0.2	0.3	0.3	0.3	1.3	1.1	0.8	0.6	0.5	n/a
	D/A Ratio	18.4%	14.6%	15.1%	15.3%	41.9%	36.6%	29.9%	21.6%	11.6%	0.0%
	Rate of Return on Equity	-3.8%	2.5%	-2.0%	-1.3%	6.0%	6.1%	7.4%	8.4%	9.2%	9.8%
	Term Debt Coverage Ratio	0.48	5.50	0.70	0.68	4.80	0.83	0.83	0.83	0.82	0.89
Crop Medium Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
	D/A Ratio	46.5%	50.0%	53.8%	57.8%	71.1%	61.3%	58.5%	54.8%	50.0%	44.2%
	Rate of Return on Equity	-6.6%	-5.8%	-5.6%	-5.2%	9.8%	32.5%	9.6%	11.3%	12.6%	13.7%
	Term Debt Coverage Ratio	0.67	0.01	-0.22	-0.29	0.71	1.37	0.64	0.62	0.66	7.27
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	93.4%	102.1%	111.4%	121.4%	124.0%	128.9%	133.4%	137.6%	141.5%	144.8%
	Rate of Return on Equity	-53.5%	-227.7%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	0.02	-0.01	-0.05	-0.10	1.77	0.49	0.46	0.44	0.41	0.41
Cow-Calf High Leverage	**Current Ratio**	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0. 1	0.1	0.1
	D/A Ratio	65.4%	65.6%	66.1%	66.4%	68.2%	68.7%	69.2%	69.6%	69.9%	70.3%
	Rate of Return on Equity	11.6%	8.7%	9.0%	9.3%	9.0%	8.7%	9.1%	9.4%	9.6%	9.7%
	Term Debt Coverage Ratio	0.69	0.53	0.49	0.46	0.51	0.41	0.37	0.76	0.75	0.70
Div. High Leverage	**Current Ratio**	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	64.8%	66.3%	67.8%	69.2%	72.7%	73.2%	73.5%	73.8%	73.9%	73.9%
	Rate of Return on Equity	0.6%	0.0%	0.4%	0.8%	3.8%	3.9%	4.7%	5.4%	6.0%	6.6%
	Term Debt Coverage Ratio	0.52	0.44	0.40	0.37	0.69	0.51	0.47	0.67	0.65	0.64

years were in the red zone. The debt-to-asset ratio decreased 4.1 percentage points from years one to 10, and the farm realized six years of green zone profitability and four years of yellow zone profitability. However, the term debt coverage ratio never roses above 0.38.

Two-Year Price Shock Farms

This management scenario had a similar impact on the two-year price shock farms as it did on the baseline farms (table 4.14). The crop farm and diversified farms experienced comparable results with poor financial indicators in all sections. Both farms became technically insolvent, the crop farm in year one and the diversified farm in year 10. The debt-to-asset ratio of the crop farm increased 247.4 percentage points to 354.6 percent by year 10. The debt-to-asset ratio of the diversified farm increased 34.9 percentage points between year one and year 10. The rate of return on equity was worse for the diversified farm in this management scenario than it was in the base simulation, and the debt coverage deteriorated for the crop farm between the base simulation and this management scenario. Again, the cow-calf farm improved between the base simulation and this management scenario. The farm experienced green zone liquidity in year one, and yellow zone liquidity the next. The debt-to-asset ratio decreased 3.4 percentage points from years 1 to 10, and the farm realized nine years of green zone profitability and one year of yellow zone profitability. The term debt coverage ratio reached 0.91 in year eight, but was never in the green zone.

Four-Year Price Shock Farms

The crop farms at each leverage position showed no improvement in any financial measure, and they each became technically insolvent; the low leverage in year five,

medium leverage in year three, and high leverage in year one (table 4.15). The diversified farm suffered the same fate as the crop farm, and became technically insolvent in year eight. The cow-calf farm still had green zone liquidity in year one, and yellow zone liquidity in year two with the remaining eight years in the red zone. The debt-to-asset ratio decreased 2.7 percentage points from years 1 to 10. The farm shows seven years of green zone profitability and three years of yellow zone profitability. Debt repayment capacity was in the red zone all 10 years for the cow-calf farm.

Management Scenario Three

Management scenario three also looked at how a change in cropping pattern and/or a sell off of real estate impacted the various farms. The crop and diversified farms planted all 222 acres to wheat and 222 acres to soybeans for all 10 years of the simulation. The cow-calf and diversified farms sold 222 acres of pastureland and leased it back.

Baseline Farms

This management scenario produced results similar to management scenario two (table 4.16). The financial condition of the crop farm and diversified farm deteriorated while the cow-calf farm improved. The crop farm ended with a 234 percent debt-to-asset ratio and became technically insolvent in year two. The debt-to-asset ratio of the diversified increased 12.4 percentage points by year 10, but stayed below the financially stressed threshold. Liquidity, profitability and debt repayment capacity for the crop and

Table 4.13: Management Scenario Two, Base Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	D/A Ratio	101.4%	119.6%	139.9%	162.6%	172.1%	198.1%	227.0%	259.0%	294.3%	333.1%
	Rate of Return on Equity	-193.9%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.60	-0.66	-0.74	-0.83	-3.53	-0.93	-1.02	-1.13	-1.23	-1.44
Cow-Calf High Leverage	**Current Ratio**	2.3	1.4	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.1%	63.0%	60.3%	59.7%	61.5%	61.5%	61.5%	61.4%	61.2%	61.0%
	Rate of Return on Equity	12.8%	9.5%	10.4%	10.9%	9.9%	9.6%	9.8%	10.0%	10.1%	10.1%
	Term Debt Coverage Ratio	0.74	0.57	0.56	0.54	0.59	0.48	0.44	0.92	0.92	0.89
Div. High Leverage	**Current Ratio**	1.2	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
	D/A Ratio	65.2%	66.3%	69.1%	71.9%	78.4%	82.0%	85.6%	89.3%	93.1%	96.9%
	Rate of Return on Equity	-2.5%	-3.4%	-3.3%	-3.5%	-7.2%	-9.5%	-11.5%	-14.8%	-21.3%	-38.5%
	Term Debt Coverage Ratio	0.38	0.30	0.27	0.23	0.25	0.16	0.11	0.10	0.04	-0.02

Table 4.14: Management Scenario Two, Two-Year Price Shock Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	D/A Ratio	107.2%	132.2%	153.9%	178.1%	184.8%	212.2%	242.8%	276.6%	313.8%	354.6%
	Rate of Return on Equity	-456.8%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-1.05	-1.13	-0.79	-0.88	-3.73	-0.98	-1.08	-1.18	-1.29	-1.51
Cow-Calf High Leverage	**Current Ratio**	2.3	1.3	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.4%	63.5%	60.9%	60.6%	62.4%	62.4%	62.4%	62.3%	62.2%	62.0%
	Rate of Return on Equity	11.4%	8.9%	10.6%	11.1%	10.0%	9.7%	10.0%	10.1%	10.2%	10.3%
	Term Debt Coverage Ratio	0.69	0.54	0.56	0.54	0.58	0.47	0.44	0.91	0.91	0.87
Div. High Leverage	**Current Ratio**	0.9	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
	D/A Ratio	66.1%	69.1%	72.0%	75.1%	81.4%	85.2%	89.0%	92.9%	96.9%	101.0%
	Rate of Return on Equity	-6.4%	-7.7%	-4.1%	-4.4%	-8.9%	-12.3%	-15.7%	-22.5%	-40.5%	-196.7%
	Term Debt Coverage Ratio	0.23	0.16	0.26	0.21	0.23	0.14	0.09	0.07	0.01	-0.05

Table 4.15: Management Scenario Two, Four-Year Price Shock Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop Low Leverage	**Current Ratio**	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	D/A Ratio	32.6%	45.5%	65.4%	88.2%	111.2%	130.7%	152.7%	177.4%	204.9%	235.5%
	Rate of Return on Equity	-22.4%	-21.6%	-41.9%	-85.3%	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.73	-11.34	-17.46	-18.38	-6.06	-1.00	-1.10	-1.20	-1.31	-1.56
Crop Medium Leverage	**Current Ratio**	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	D/A Ratio	60.9%	81.4%	104.9%	131.4%	145.4%	160.2%	185.7%	214.1%	245.6%	280.2%
	Rate of Return on Equity	-36.5%	-64.0%	-280.9%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.52	-1.24	-15.15	-16.70	-0.90	-0.32	-1.14	-1.24	-1.47	-17.25
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	D/A Ratio	107.2%	132.2%	160.4%	192.2%	196.3%	225.1%	257.1%	292.5%	331.4%	374.1%
	Rate of Return on Equity	-456.8%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-1.05	-1.13	-1.23	-1.35	-3.91	-1.03	-1.13	-1.24	-1.35	-1.57
Cow-Calf High Leverage	**Current Ratio**	2.3	1.3	0.5	0.3	0.2	0.1	0.1	0. 1	0.1	0.1
	D/A Ratio	65.4%	63.5%	61.2%	61.2%	63.0%	63.0%	63.0%	63.0%	62.9%	62.7%
	Rate of Return on Equity	11.4%	8.9%	9.9%	10.5%	10.1%	9.8%	10.0%	10.2%	10.3%	10.4%
	Term Debt Coverage Ratio	0.69	0.54	0.53	0.51	0.58	0.47	0.43	0.90	0.90	0.90
Div. High Leverage	**Current Ratio**	0.9	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
	D/A Ratio	66.1%	69.1%	73.4%	77.8%	84.1%	88.0%	92.0%	96.1%	100.2%	104.5%
	Rate of Return on Equity	-6.4%	-7.7%	-8.8%	-10.5%	-10.9%	-15.6%	-21.8%	-36.7%	-121.1%	n/a
	Term Debt Coverage Ratio	0.23	0.16	0.11	0.06	0.21	0.13	0.07	0.04	-0.02	-0.08

diversified farms were worse under this management scenario when compared to the original baseline. The cow-calf farm had three years of green zone liquidity and one year of yellow zone liquidity. The debt-to-asset ratio decreased 13.2 percentage points, taking the cow-calf farm from a red zone solvency position to a yellow zone one. The cow-calf farm also improved its profitability, going from two years of green zone in the original baseline to nine.

Two-Year Price Shock Farms

This management scenario had a similar impact on the two-year price shock farms as it did on the original baseline farms (table 4.17). The crop farm and diversified farms experienced comparable results with poor financial indicators in all of the evaluated financial measures. The crop farm became technically insolvent in year one, ending with a 252.5 percent debt-to-asset ratio. Both the cow-calf and diversified farms had green zone liquidity in years one through three for the cow-calf, and year one for the diversified. Similar to the baseline simulation, the debt-to-asset ratio of the cow-calf farm decreased 12.5 percentage points from years 1 to 10, which took it from a red zone solvency position to a yellow zone one. The cow-calf farm also has nine years of green zone profitability and one year of yellow zone profitability. The term debt coverage ratio reached 0.91 in year eight, but never reached the good level of 1.3 or greater.

Four-Year Price Shock Farms

Results of this management scenario were similar to the results of the second management scenario (table 4.18). The crop farms at each leverage position showed no improvement in any financial measure. The year 10 debt-to-asset ratio for the low leverage crop farm was 127.3 percent, 172.2 percent for the medium leverage crop farm

and 268.9 percent for the high leverage crop farm. Each crop farm became technically insolvent; the low leverage in year eight, medium leverage in year five, and high leverage in year one. The solvency of the diversified farm deteriorated, increasing 18.6 percentage points, but did not become insolvent. The cow-calf farm maintained green zone liquidity from years one to three, had yellow zone liquidity in year four and the remaining six years were in the red zone. The debt-to-asset ratio of the cow-calf farm decreased 11.8 percentage points from years 1 to 10, and the farm showed nine years of green zone profitability with the one remaining year being in the yellow zone. The cow-calf farm's debt repayment capacity was in the red zone all 10 years.

Management Scenario Four

Management scenario four only applied to the crop and diversified farms and evaluated how a change in cropping pattern and/or a sell off of real estate impacted the various farms. The crop and diversified farms planted all 444 acres to wheat in years one and two, and returned to the even mix of corn, wheat and soybeans in years one through three. The cow-calf and diversified farms sold 111 acres of pastureland and leased it back.

Baseline Farms

The crop farm had serious liquidity issues and became technically insolvent in year one (table 4.19). The debt-to-asset ratio increased 60.5 percentage points ending at 161.9 percent in year 10. The measures of profitability and debt repayment capacity both declined from the original baseline simulation. The rate of return on equity was

Table 4.16: Management Scenario Three, Baseline Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
	D/A Ratio	95.0%	105.6%	117.1%	129.7%	139.4%	155.2%	172.5%	191.4%	211.8%	234.0%
	Rate of Return on Equity	-72.9%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.11	-0.14	-0.19	-0.25	-1.16	-0.29	-0.36	-0.43	-0.50	-0.62
Cow-Calf High Leverage	**Current Ratio**	4.0	3.0	2.1	1.4	0.7	0.3	0.3	0.2	0.2	0.2
	D/A Ratio	65.1%	63.1%	60.4%	56.9%	56.4%	55.0%	54.3%	53.6%	52.7%	51.9%
	Rate of Return on Equity	12.6%	9.3%	10.5%	11.5%	10.9%	10.8%	11.0%	11.1%	11.0%	11.0%
	Term Debt Coverage Ratio	0.73	0.56	0.56	0.56	0.64	0.54	0.50	1.07	1.08	1.06
Div. High Leverage	**Current Ratio**	2.5	1.4	0.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	64.4%	63.6%	62.4%	63.2%	68.8%	70.5%	72.1%	73.7%	75.3%	76.8%
	Rate of Return on Equity	0.7%	0.3%	1.5%	2.3%	0.2%	0.0%	0.6%	1.1%	1.5%	2.0%
	Term Debt Coverage Ratio	0.52	0.45	0.45	0.42	0.53	0.38	0.34	0.45	0.42	0.39

Table 4.17: Management Scenario Three, Two-Year Price Shock Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
	D/A Ratio	100.0%	116.4%	129.2%	143.1%	150.3%	167.4%	186.1%	206.4%	228.6%	252.5%
	Rate of Return on Equity	-158.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.49	-0.54	-0.23	-0.29	-1.33	-0.34	-0.41	-0.48	-0.55	-0.68
Cow-Calf High Leverage	**Current Ratio**	3.9	2.9	2.0	1.3	0.6	0.3	0.2	0.2	0.2	0.2
	D/A Ratio	65.5%	63.6%	60.9%	57.4%	56.9%	55.9%	55.3%	54.6%	53.8%	53.0%
	Rate of Return on Equity	11.3%	8.7%	10.7%	11.7%	11.1%	11.0%	11.1%	11.2%	11.2%	11.1%
	Term Debt Coverage Ratio	0.68	0.53	0.56	0.56	0.63	0.53	0.50	1.06	1.07	1.04
Div. High Leverage	**Current Ratio**	2.3	1.1	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.2%	65.2%	64.8%	66.0%	71.5%	73.4%	75.2%	77.0%	78.8%	80.5%
	Rate of Return on Equity	-2.6%	-2.9%	1.5%	2.1%	-0.2%	-0.5%	0.0%	0.6%	1.0%	1.5%
	Term Debt Coverage Ratio	0.38	0.33	0.44	0.41	0.51	0.36	0.32	0.43	0.39	0.37

Table 4.18: Management Scenario Three, Four-Year Price Shock Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop Low Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
	D/A Ratio	25.1%	23.9%	39.0%	50.0%	74.2%	82.8%	92.4%	103.0%	114.6%	127.3%
	Rate of Return on Equity	-12.2%	-7.1%	-14.9%	-18.2%	-19.5%	-31.5%	-55.2%	-287.3%	n/a	n/a
	Term Debt Coverage Ratio	-0.09	-2.51	-7.49	-8.39	-1.42	-0.21	-0.27	-0.33	-0.40	-0.51
Crop Medium Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
	D/A Ratio	53.3%	65.0%	78.1%	92.8%	108.2%	112.2%	125.2%	139.5%	155.2%	172.2%
	Rate of Return on Equity	-19.8%	-25.5%	-38.3%	-77.9%	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	0.10	-0.59	-7.32	-8.10	-0.21	0.40	-0.38	-0.45	-0.56	-6.79
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	D/A Ratio	100.0%	116.4%	134.7%	154.9%	159.9%	178.2%	198.1%	219.8%	243.4%	268.9%
	Rate of Return on Equity	-158.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.49	-0.54	-0.61	-0.69	-1.48	-0.38	-0.45	-0.52	-0.60	-0.73
Cow-Calf High Leverage	**Current Ratio**	3.9	2.9	2.0	1.3	0.5	0.3	0.2	0.2	0.2	0.2
	D/A Ratio	65.5%	63.6%	61.1%	57.8%	57.3%	56.6%	55.9%	55.3%	54.5%	53.7%
	Rate of Return on Equity	11.3%	8.7%	10.0%	11.1%	11.2%	11.1%	11.2%	11.3%	11.3%	11.2%
	Term Debt Coverage Ratio	0.68	0.53	0.53	0.53	0.63	0.53	0.50	1.05	1.06	1.04
Div. High Leverage	**Current Ratio**	2.3	1.1	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.2%	65.2%	66.1%	68.6%	74.0%	76.1%	78.1%	80.0%	81.9%	83.8%
	Rate of Return on Equity	-2.6%	-2.9%	-2.0%	-1.7%	-0.6%	-1.0%	-0.5%	0.0%	0.4%	0.9%
	Term Debt Coverage Ratio	0.38	0.33	0.31	0.28	0.49	0.35	0.31	0.41	0.37	0.34

consistently in the red zone. The term debt coverage ratio was in the red zone for nine years, the exception being a term debt coverage ratio of 1.27 in year five putting it in the yellow zone. The diversified farm showed a yellow zone liquidity position in year one, but the remaining nine years are in the red zone. The debt-to-asset ratio increased 4.5 percentage points more than it did in the original baseline simulation. The diversified farm had five years of yellow zone profitability with the remaining years being in the red zone. The debt repayment capacity was in the red zone all 10 years for the diversified farm.

Two-Year Price Shock Farms

Like the previous results the crop farm had a red zone liquidity position all 10 years (table 4.20). The debt-to-asset ratio increased by 76.2 percentage points, ending at 183.4 percent in year 10, and the farm became technically insolvent in year one. The rate of return on equity was in the red zone all 10 years and the term debt coverage ratio peaked at 1.07 in year five while the remaining nine years were in the red zone. The diversified farm sees no change to its liquidity or debt repayment capacity when compared to the baseline of this management scenario. The debt-to-asset ratio increased 7.6 percentage points to 73.7 percent. The diversified farm experiences five years of fair profitability.

Four-Year Price Shock Farms

This management scenario did not benefit either the crop or diversified farm with a four year price shock (table 4.21). The crop farms at each leverage position showed no improvement in any financial measure. The year 10 debt-to-asset ratios for each crop farm were 108.8 percent in the low leverage crop farm, 153.7 percent for the medium

Table 4.19. Management Scenario Four, Baseline Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	101.4%	117.0%	121.0%	124.8%	128.1%	134.9%	141.7%	148.5%	155.3%	161.9%
	Rate of Return on Equity	-193.9%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.60	-0.47	0.37	0.34	1.27	0.36	0.33	0.29	0.26	0.24
Div. High Leverage	**Current Ratio**	1.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.2%	65.8%	65.7%	65.5%	69.3%	69.7%	69.8%	69.9%	69.8%	69.7%
	Rate of Return on Equity	-2.5%	-2.1%	5.3%	5.9%	4.1%	4.2%	4.9%	5.6%	6.2%	6.7%
	Term Debt Coverage Ratio	0.38	0.36	0.58	0.56	0.72	0.52	0.49	0.69	0.67	0.67

Table 4.20. Management Scenario Four, Two-Year Price Shock Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
	D/A Ratio	107.2%	129.6%	135.0%	140.3%	140.8%	149.1%	157.5%	166.1%	174.7%	183.4%
	Rate of Return on Equity	-456.8%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-1.05	-0.94	0.32	0.29	1.07	0.30	0.27	0.23	0.19	0.17
Div. High Leverage	**Current Ratio**	0.9	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	66.1%	68.6%	68.7%	68.6%	72.4%	72.9%	73.3%	73.5%	73.7%	73.7%
	Rate of Return on Equity	-6.4%	-6.2%	5.4%	6.0%	4.0%	4.1%	4.9%	5.7%	6.4%	7.0%
	Term Debt Coverage Ratio	0.23	0.21	0.57	0.54	0.69	0.50	0.47	0.66	0.64	0.64

Table 4.21. Management Scenario Four, Four-Year Price Shock Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop Low Leverage	**Current Ratio**	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	D/A Ratio	32.6%	45.5%	65.4%	85.2%	95.3%	98.6%	101.7%	104.4%	106.8%	108.8%
	Rate of Return on Equity	-22.4%	-21.6%	-41.9%	-68.9%	-3.4%	-9.6%	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.73	-11.34	-17.46	-15.50	2.28	0.42	0.39	0.36	0.33	0.33
Crop Medium Leverage	**Current Ratio**	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	D/A Ratio	60.9%	81.4%	104.9%	128.4%	129.4%	128.0%	134.5%	141.0%	147.4%	153.7%
	Rate of Return on Equity	-36.5%	-64.0%	-280.9%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.52	-1.24	-15.15	-14.22	0.34	0.98	0.23	0.19	0.16	1.58
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	D/A Ratio	107.2%	132.2%	160.4%	189.4%	180.8%	193.8%	207.4%	221.5%	236.2%	251.3%
	Rate of Return on Equity	-456.8%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-1.05	-1.13	-1.23	-1.16	0.45	0.14	0.09	0.05	0.00	-0.05
Div. High Leverage	**Current Ratio**	0.9	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
	D/A Ratio	66.1%	69.1%	73.4%	77.3%	80.9%	81.9%	82.8%	83.6%	84.3%	84.9%
	Rate of Return on Equity	-6.4%	-7.7%	-8.8%	-8.4%	3.6%	3.7%	5.0%	6.2%	7.3%	8.4%
	Term Debt Coverage Ratio	0.23	0.16	0.11	0.11	0.63	0.46	0.42	0.58	0.56	0.54

leverage, and 251.3 percent for the high leverage farm. Each crop farm became technically insolvent; the low leverage in year seven, medium leverage in year three, and high leverage in year one. The solvency of the diversified farm deteriorated by 18.8 percentage points, but the farm did not become insolvent. The term debt coverage ratio of low leverage crop farm peaked at 2.28 in one year which was the only year in the green zone, the remaining nine years were in the red zone. The diversified farm shows a yellow zone level of profitability from years eight through 10.

Management Scenario Five

Management scenario five only applied to the crop and diversified farms and looked at how a change in cropping pattern and/or a sell off of real estate impacted the various farms. The crop and diversified farms planted 222 acres to wheat and 222 acres to soybeans in years one and two, and returned to the even mix of corn, wheat and soybeans in years one through three. The cow-calf and diversified farms sold 222 acres of pastureland and leased it back.

Baseline Farms

The crop farm had serious liquidity issues and became technically insolvent in year two (table 4.22). The debt-to-asset ratio of the crop farm increased 46.3 percentage points to 141.3 percent at the end of year 10. The rate of return on equity reached -3,724 percent in year 10. There was one year of green zone debt repayment capacity. The diversified farm showed improvement in each financial category with the exception of the debt repayment capacity. Liquidity in year one was in the green zone (2.5 current

ratio) and yellow zone in year two, with the remaining eight years in the red zone. The debt-to-asset ratio decreased 3.4 percentage points over the ten years ending at 61 percent.

Two-Year Price Shock Farms

Like the previous results, the crop farm had liquidity issues and became technically insolvent in year one (table 4.23). The debt-to-asset ratio by the end of year one was already 100 percent and eventually increased 59.8 percentage points over the 10 years. Debt repayment capacity reached its highest level in year five at 1.29 which was still only a yellow zone position, worse than the original simulation where it was in a green zone positon. The diversified farm showed improvement in each financial category except the debt repayment capacity. Liquidity was green zone in year one and yellow zone in year two, but the remaining eight years were in the red zone. The diversified farm reduced its debt-to-asset ratio only marginally (0.6 percentage points). Profitability for the diversified farm was in the yellow zone seven out of 10 years.

Four-Year Price Shock Farms

This management scenario did not benefit the crop farm with a four-year price shock (table 4.24). The crop farms at each leverage position showed no improvement in any financial measure. The debt-to-asset ratios of each crop farm increases over the 10 years 33.9 percentage points for the low leverage, 50.6 percentage points for the medium leverage, and 102.7 percentage points for the high leverage. The medium and high leverage cases became technically insolvent; the medium leverage in year eight, and the high leverage in year one. The low leverage crop farm moved from a green zone solvency position (25.1 percent debt-to-asset ratio) to a high yellow zone (59 percent debt-to-asset

ratio) position by the end of year 10. The solvency of the diversified farm deteriorated by 7.2 percentage points, but the farm did not become insolvent. The low leverage crop farm had a term debt coverage ratio of 3.13 in year one, putting it in the green zone. The diversified farm showed a yellow zone profitability positon in years six through 10, peaking at 8.2 percent in year 10. The diversified farm had only red zone level of debt repayment capacity all 10 years.

Management Scenario Six

Management scenario six was a debt management strategy, whereby farms sold off and replaced machinery at a rate of 10 percent per year in order to avoid taking on a large amount of new debt at a single point in time.

Baseline Farms

The crop farm had red zone liquidity up to year 10 when the current ratio reached 1.6, a green zone position (table 4.25). The solvency of the crop farm improved ending year 10 down 29.8 percentage points from year one. The profitability of the crop farm was in the green zone from years two through 10. Debt repayment capacity was still an issue with nine years in the red zone and only one green zone year, but this was similar to the results of the original simulation. The cow-calf farm did not have much improvement other than in the profitability area. The debt-to-asset ratio increased 1.7 percentage points. Debt repayment capacity was weak. The diversified farm showed solvency improvement, with a 7 percentage point decrease in the debt-to-asset ratio. The diversified farm's profitability was also improved with eight years of yellow zone rate of returns on equity.

Table 4.22: Management Scenario Five, Baseline Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	95.0%	104.9%	107.6%	109.9%	116.0%	121.4%	126.6%	131.7%	136.6%	141.3%
	Rate of Return on Equity	-72.9%	-3724.0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.11	-0.09	0.41	0.39	1.46	0.41	0.38	0.35	0.32	0.30
Div. High Leverage	**Current Ratio**	2.5	1.4	0.7	0.3	0.3	0.2	0.1	0.1	0.1	0.1
	D/A Ratio	64.4%	63.6%	61.2%	59.6%	69.6%	63.4%	63.0%	62.5%	61.8%	61.0%
	Rate of Return on Equity	0.7%	0.6%	5.8%	6.6%	5.0%	5.1%	5.8%	6.4%	6.9%	7.2%
	Term Debt Coverage Ratio	0.52	0.46	0.62	0.60	0.78	0.58	0.55	0.78	0.77	0.77

Table 4.23: Management Scenario Five, Two-Year Price Shock Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	100.0%	115.8%	119.7%	123.3%	126.9%	133.6%	140.2%	146.8%	153.4%	159.8%
	Rate of Return on Equity	-158.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.49	-0.49	0.38	0.34	1.29	0.36	0.33	0.30	0.26	0.24
Div. High Leverage	**Current Ratio**	2.3	1.1	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.2%	65.1%	63.0%	62.4%	66.4%	66.3%	66.1%	65.8%	65.2%	64.6%
	Rate of Return on Equity	-2.6%	-2.5%	6.0%	6.8%	5.0%	5.1%	5.9%	6.5%	7.0%	7.5%
	Term Debt Coverage Ratio	0.38	0.34	0.61	0.59	0.76	0.56	0.53	0.76	0.74	0.74

Table 4.24: Management Scenario Five, Four-Year Price Shock Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop Low Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	25.1%	29.3%	39.0%	49.2%	66.2%	66.0%	65.3%	63.9%	61.8%	59.0%
	Rate of Return on Equity	-12.2%	-7.1%	-14.9%	-16.8%	3.1%	3.6%	6.1%	8.4%	10.4%	12.1%
	Term Debt Coverage Ratio	-0.09	-2.51	-7.94	-7.67	3.13	0.57	0.55	0.52	0.50	0.52
Crop Medium Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	53.3%	65.0%	78.1%	92.1%	10.1%	95.3%	98.0%	100.4%	102.4%	103.9%
	Rate of Return on Equity	-19.8%	-25.5%	-38.3%	-71.2%	9.6%	358.6%	15.7%	140.7%	n/a	n/a
	Term Debt Coverage Ratio	0.10	-0.59	-7.32	-7.48	0.46	1.11	0.37	0.34	0.33	3.50
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
	D/A Ratio	100.0%	116.4%	134.7%	154.2%	152.1%	161.8%	171.7%	181.8%	192.2%	202.7%
	Rate of Return on Equity	-158.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.49	-0.54	-0.61	-0.64	0.90	0.26	0.22	0.18	0.14	0.10
Div. High Leverage	**Current Ratio**	2.3	1.1	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.2%	65.2%	66.1%	68.5%	72.3%	72.6%	72.8%	72.8%	72.7%	72.4%
	Rate of Return on Equity	-2.6%	-2.9%	-2.0%	-1.3%	5.0%	5.2%	6.1%	6.9%	7.6%	8.2%
	Term Debt Coverage Ratio	0.38	0.33	0.31	0.29	0.72	0.52	0.50	0.70	0.69	0.68

Two-Year Price Shock Farms

Results for the two-year price shock farms were mixed (table 4.26). The crop farm became technically insolvent in year two, but the diversified farm reduced their debt-to-asset ratio by 2.9 percentage points. The debt-to-asset ratio of the cow-calf farm increased 2.5 percentage points. The cow-calf farm had five years of green zone profitability and five years of yellow zone rate of returns on equity. The diversified farm also has eight years of fair profitability ratios. No change in pattern was observed in the term debt coverage ratio for any of the three farms.

Four-Year Price Shock Farms

Improvements in solvency, profitability, and repayment capacity were seen with the four-year price shock farms (table 4.27). The low and medium leverage crop farms improved their debt-to-asset ratios, the low leverage farm by 15.5 percentage points and the medium leverage farm by 38.8 percentage points. The medium leverage crop farm moved from a yellow zone solvency position to a green zone one by the end of year 10. The high leverage farm reached technical insolvency in year two and ended with a 135 percent debt-to-asset ratio. Profitability is in the green zone three years for the low leverage crop farm, and six years for the medium leverage crop farm and the cow-calf farm. The diversified farm maintained a yellow zone solvency position for all ten years with the debt-to-asset ratio increasing 1.7 percentage points from year one to year 10. The low leverage crop farm had seven years with a term debt coverage ratio in the green zone. The medium leverage crop farm had two years of green zone debt repayment capacity and four years of yellow zone capacity. The debt repayment capacity for the cow-calf farm and diversified farm was in the red zone for all 10 years.

Table 4.25: Management Scenario Six, Baseline Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.6	0.9	1.6
	D/A Ratio	86.3%	86.0%	83.9%	79.6%	83.6%	81.5%	77.0%	71.8%	64.9%	56.5%
	Rate of Return on Equity	2.8%	17.9%	29.8%	37.5%	24.7%	24.6%	32.8%	36.4%	36.0%	33.6%
	Term Debt Coverage Ratio	0.47	0.49	0.49	0.48	2.66	0.89	0.92	0.95	0.97	0.97
Cow-Calf High Leverage	**Current Ratio**	0.7	0.3	0.2	0.1	0.1	0.1	0.1	0. 1	0.1	0.1
	D/A Ratio	65.2%	65.2%	65.6%	65.8%	66.1%	66.4%	66.5%	66.7%	66.8%	66.9%
	Rate of Return on Equity	12.4%	8.9%	9.2%	9.5%	9.6%	9.8%	9.9%	10.0%	10.0%	10.0%
	Term Debt Coverage Ratio	0.73	0.54	0.50	0.47	0.49	0.45	0.41	1.04	1.05	1.01
Div. High Leverage	**Current Ratio**	0.6	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	63.5%	62.6%	62.0%	61.1%	62.5%	61.8%	60.8%	59.7%	58.2%	56.6%
	Rate of Return on Equity	4.6%	4.2%	5.2%	6.0%	5.3%	5.5%	6.3%	7.0%	7.5%	8.0%
	Term Debt Coverage Ratio	0.68	0.60	0.58	0.55	0.74	0.63	0.61	0.99	1.00	1.00

Table 4.26: Management Scenario Six, Two-Year Price Shock Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3
	D/A Ratio	94.4%	104.6%	105.8%	105.5%	105.3%	107.0%	107.0%	104.7%	99.4%	90.2%
	Rate of Return on Equity	-69.0%	-846.9%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	310.3%
	Term Debt Coverage Ratio	-0.13	-0.13	0.43	0.42	2.30	0.76	0.79	0.82	0.84	0.87
Cow-Calf High Leverage	**Current Ratio**	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0. 1	0.1	0.1
	D/A Ratio	65.5%	66.0%	66.4%	66.7%	67.0%	67.3%	67.5%	67.6%	67.8%	68.0%
	Rate of Return on Equity	11.1%	8.3%	9.3%	9.6%	9.7%	9.9%	10.0%	10.1%	10.2%	10.2%
	Term Debt Coverage Ratio	0.67	0.51	0.50	0.46	0.49	0.45	0.40	1.02	1.03	0.99
Diversified High Leverage	**Current Ratio**	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	64.7%	66.1%	65.7%	65.1%	66.4%	66.0%	65.3%	64.4%	63.2%	61.8%
	Rate of Return on Equity	-0.1%	-0.3%	5.2%	6.1%	5.4%	5.5%	6.4%	7.2%	7.9%	8.4%
	Term Debt Coverage Ratio	0.47	0.40	0.56	0.53	0.71	0.60	0.58	0.93	0.94	0.94

Table 4.27: Management Scenario Six, Four-Year Price Shock Farms Simulation Results

Years		1	2	3	4	5	6	7	8	9	10
Crop Low Leverage	**Current Ratio**	0.3	0.7	3.7	8.8	3.4	5.1	6.5	7.8	8.9	262,745
	D/A Ratio	15.5%	7.4%	2.3%	1.2%	23.6%	19.7%	15.3%	10.5%	5.3%	0.0%
	Rate of Return on Equity	-5.4%	1.8%	-2.0%	-0.5%	8.2%	7.9%	9.1%	10.0%	10.6%	10.9%
	Term Debt Coverage Ratio	0.32	3.75	-1.06	-0.85	8.42	1.41	1.42	1.42	1.42	1.42
Crop Medium Leverage	**Current Ratio**	0.2	0.2	0.2	0.2	0.2	0.6	1.4	2.6	3.6	38.0
	D/A Ratio	45.0%	46.7%	48.0%	48.8%	58.0%	39.5%	29.7%	22.6%	14.7%	6.2%
	Rate of Return on Equity	-9.0%	-7.4%	-5.9%	-3.8%	13.9%	33.3%	13.5%	15.3%	16.1%	16.2%
	Term Debt Coverage Ratio	0.51	-0.13	-1.66	-1.59	6.48	2.47	1.13	1.17	1.19	1.19
Crop High Leverage	**Current Ratio**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	94.4%	104.6%	116.0%	128.9%	124.9%	130.1%	134.2%	136.8%	137.3%	135.0%
	Rate of Return on Equity	-69.0%	-846.9%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Term Debt Coverage Ratio	-0.13	-0.13	-0.17	-0.21	1.97	0.65	0.67	0.69	0.71	0.74
Cow-Calf High Leverage	**Current Ratio**	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	65.5%	66.0%	66.6%	67.2%	67.5%	67.8%	68.0%	68.2%	68.4%	68.6%
	Rate of Return on Equity	11.1%	8.3%	8.6%	8.9%	9.8%	10.0%	10.1%	10.2%	10.3%	10.3%
	Term Debt Coverage Ratio	0.67	0.51	0.47	0.43	0.49	0.44	0.40	1.01	1.02	0.98
Diversified High Leverage	**Current Ratio**	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	D/A Ratio	64.7%	66.1%	67.3%	68.4%	69.8%	69.6%	69.2%	68.5%	67.6%	66.4%
	Rate of Return on Equity	-0.1%	-0.3%	0.4%	1.2%	5.4%	5.6%	6.6%	7.5%	8.3%	8.9%
	Term Debt Coverage Ratio	0.47	0.40	0.37	0.34	0.69	0.57	0.55	0.89	0.90	0.89

CHAPTER V

CONCLUSION

Discussion

This analysis was conducted to further explore patterns of farm financial stress. Results were used to determine the factors that contribute the most to farm financial stress, compare the effects of price and debt on the survivability of a farm business, and to determine the factors associated with successful transition through periods of farm financial stress. The results of this study show the impact that output prices and debt have on a farm business, especially the combination of low prices and high debt. Expectations were developed to analyze how various management strategies could affect the performance of an Oklahoma farm business. These expectations evaluate the effects of prices, debt, type of production, and management decisions on how farm businesses can survive periods of farm financial stress.

Under the framework of this analysis, there was virtually no relief for the crop farm; 30 out of 39 (76.9 percent) of cases had a higher debt-to-asset ratio at the end of the simulation. Of the 30 cases that got worse, 25 (83.3 percent) became technically insolvent at some point. One case, the high leverage crop farm with a two-year price

shock, under management scenario six (debt management) became technically insolvent in year two, but by year 10 the debt-to-asset ratio was 4.2 percentage points lower than it was in year one. Of the management scenarios, management scenario six made the most impact on the crop farms improving three out of the five cases. Since this scenario imposed lower debt obligations on the crop farm in the middle years, it could be concluded that aggressively managing debt especially in periods of low output prices, is a way to move through periods of farm financial stress. Further research should evaluate the role that the cost of debt plays on farm survivability, especially in periods of low crop commodity prices.

The picture was even worse for the highly leveraged crop farms. Of the 21 highly leverage crop farms evaluated, 20 had a worse solvency position by the end of the 10-year simulation. Out of the 20 that declined, 18 reached technical insolvency. Management scenarios two, three, four, and five (changing cropping pattern and selling land) all had no positive impact on the crop farms. Management scenarios two, three, and four all made the crop farms evaluated reach technical insolvency quicker than in the original baseline simulations.

A better outlook existed when evaluating the cow-calf operations. A 57 percentage point improvement rate was observed for all the cow-calf farms tested. The most important aspect to consider was that none of the cow-calf farms from the baseline cases or the management scenario cases became technically insolvent. This could be attributed to the impact that prices play in this simulation. Since the current (January 12, 2018) price for cattle used in the simulations was only 2.3 percent lower than the 10-year average price (compared to the current price for wheat which was 39.4 percent lower than

the 10-year average price), the price shock for the cow-calf farms, even when shocked for four years, was not as harmful to the survivability of the farm as was the price shocks on the crop farms. Even negative effects were marginal, with six out of nine farms that had an increased debt-to-asset ratio increasing less than five percentage points from year one to year 10.

Management scenarios two and three were the most effective for improving the financial health of the cow-calf farms with a 100 percent success rate. Both of these management scenarios had the cow-calf farms selling off a portion of their owned land. This sale infused liquidity into the operations. Therefore, it is reasonable to conclude that this infusion of liquidity assisted the cow-calf farms in weathering the periods low output prices. Other research should analyze the financial conditions of a representative cow-calf operation when output prices experience a decline similar to the representative crop farm in this simulation.

Results from the diversified farms were mixed; 37 percent of the 27 cases realized an improved debt-to-asset ratio by the end of year 10. The diversified farms saw the lowest rate of technical insolvency, with only two out of 27 cases (7.4 percent) reaching that level. As opposed to the crop and cow-calf farms, most of the increased debt-to-asset ratios were greater than five percent. Management scenarios five and six (changing cropping pattern and selling land, and debt management) had the best effect on the diversified farms, improving the results for the baseline diversified farm and the diversified price shock farm. Like the crop farm, there was no relief for the diversified farm under a four-year price shock in the baseline cases or any management scenario.

Management scenario one (production cost reduction) had an 18.2 percent rate of improvement, and an 18.2 percent rate of technical insolvency. Six of the nine farms that did not improve their debt-to-asset ratio saw an increase of less than five percent. Management scenario two only had a positive impact on the high leverage cow-calf farms. The parameters of management scenario two make it reasonable to say that that the improvement for the cow-calf farms was due to the sale of pastureland since the proceeds from the land sale could be allocated to covering debt obligations. The rate of technical insolvency for management scenario two was 63.6 percent.

Management scenario three (changed cropping pattern and selling of owned land) yielded results similar to management scenario two. The rate of improvement remained 27.3 percent, but the rate of technical insolvency was improved to 45.5 percent. The farms that improved were still only the cow-calf farms, most likely the result of the sale of pastureland as described previously. It is important to recognize that no diversified farm reached technical insolvency, most likely as a result of the sale of pastureland.

Management scenario four (changed cropping pattern and selling of owned land) provided the worst results of all the management scenarios with a zero percent improvement rate. Five of the eight simulations (62.5 percent) became technically insolvent. Therefore, based on these simulation results it is unlikely that planting only wheat for two years and selling owned pastureland will be a successful strategy for navigating financial stress. Management scenario five showed marginal improvement from management scenario four. There was an improvement rate of 25 percent, and the technical insolvency rate decreased to 50 percent. The two farms that improved were both diversified farms, again pointing to the impact the sale of pastureland had on farm

financial health in this analysis. The most impactful management scenario was the sixth one. Management scenario six had an improvement rate of 45.5 percent, the highest in this analysis, and a technical insolvency rate of 18.2 percent (the lowest along with management scenario 1). Of the six cases that did not improve their solvency, four of the six had declined solvency of less than five percent. This provides evidence to support the expectation that debt management can help farmers successfully navigate periods of financial stress.

Conclusion

The recent downturn in farm income is an indicator that widespread financial stress might be occurring in agriculture, but will this financial stress morph into a full-scale financial crisis? This research suggests that good farm financial management is a key to weathering the current financial downturn in agriculture. While the farm financial crisis of the 1980s was triggered by multiple factors including a collapsing export market, low crop commodity prices, a strong U.S. dollar, and historically high interest rates, today's conditions are markedly different. Interest rates have been historically low following the Great Recession of the late 2000s, and land values are at historically high levels.

In addition to the changed interest rate environment and increased land values, federal farm policy is different today than it was in the 1980s and even the 1990s. The Payment-in-Kind (PIK) program introduced in 1983 paid farmers to idle acreage as a means to reduce production and stocks of surplus commodities (USDA ERS 1983).

Additionally the 1985 Farm Bill initiated the Conservation Reserve Program which was aimed at taking environmentally sensitive land out of production in exchange for a rental payment. The direct payments introduced in the 1996 Farm Bill were eliminated in The Agricultural Act of 2014. At the same time the Congress shifted the focus of federal agricultural policy from subsidies to risk management. This research suggests that in addition to production and price risk management (the focus of current farm policy), producers also need to be concerned about financial risk.

From the simulations, it became clear that output price changes had a significant impact on the financial survival of a farm confirming expectation one. This was especially true when the amount of debt increased, as financial stress increased and farm survivability was jeopardized when high debt levels were combined with low output prices confirming expectation two. Brake and Boehlje (1985) suggested debt reduction by lenders as a way for farmers to survive the farm crisis of the 1980s, but this was shown to be prohibitively expensive to the agriculture sector. Another method suggested to reduce debt obligations was to reduce interest rates (Boehlje, Thamodaran, and Barkema 1985; Brake and Boehlje 1985; Doye and Jolly 1987). In the 1980s this would have been possible since interest rates were high, but would be impractical in the current interest rate environment.

In this analysis, the operations that included livestock production were not as negatively affected by an increased debt load. This was most likely due to a combination of cattle prices that were near the 10-year average and the increased asset values on the balance sheet. On the diversified farms, high cattle prices compensated for lower crop prices in most cases. All of these results combine to confirm expectation three that farms

which included a livestock component would have a lower degree of financial stress through periods of low commodity output prices. It is also clear that where the operation is in their loan payoff plays a critical role. The success of management scenario six suggests a way to mitigate the effects of financial stress, and confirms expectation four which stated that management strategies existed which would successfully move a farm business through a period of financial stress.

Asset management and restructuring, specifically the creation of landholding entities as suggested by Jolly and Doye (1985) would benefit farms in the current financial conditions as evidence by the effects of management scenarios two, three, four, and five on the diversified farms, and management scenarios two and three on the cow-calf farms. Management scenarios two, three, four, and five also show that farm managers must be prudent about their crop production decisions. Planting a significant amount of wheat where average returns are lower than the cost of production will lead to financial stress. Also planting a mix of crops that includes a large amount of a high input crop like soybeans will lead to the same results. However, these management scenarios only helped certain types of farms. No management scenario was able to improve every farm type at all leverage positions. This suggests that high amounts of debt are not able to be reduced in the 10 year structure of this analysis.

For highly leveraged farms, there appear to be very few options to reduce their financial stress and improve their solvency position. This indicates that while low crop commodity prices might be the trigger of financial stress, the total amount of debt is the determining factor in the survivability of a farm business. Batte, Farr, and Lee in 1989 stated “financial stability in the farm sector will be achieved through improved

profitability, not credit subsidies." The economic conditions of today's Oklahoma farm sector suggest that improved profitability, and active debt management are the keys to surviving extended periods of low crop commodity prices.

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APPENDIX

Example FINPACK Simulation Results Report

The images on the following pages are included to serve as an example of the report generated by FINPACK at the end of a ten-year simulation. The results for this analysis are taken from the "Financial Standards Measures" section of the report. The following FINPACK report example is from the baseline high leverage crop farm.

Monthly Cash Flow Plan Executive Summary

Projected Cash Flow Summary

		Beg	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*	*2025*	*2026*	*2027*
Total operating inflow			206,108	206,108	206,108	206,108	206,108	206,108	206,108	206,108	206,108	206,108
Total operating outflow	(-)		163,313	161,113	161,113	161,113	161,113	161,113	161,113	161,113	161,113	161,113
Capital purchases	(-)		-	-	-	-	363,158	-	-	-	-	-
Capital sales	(+)		-	-	-	-	144,000	-	-	-	-	-
New credit	(+)		-	-	-	-	294,095	-	-	-	-	-
Loan payments	(-)		82,117	84,116	86,072	88,126	30,642	85,818	87,859	90,003	92,253	89,273
Net cash flow	**(=)**		**-39,323**	**-39,122**	**-41,078**	**-43,132**	**89,289**	**-40,824**	**-42,865**	**-45,008**	**-47,259**	**-44,279**
Beginning cash balance	(+)		10,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Operating loan borrowings	(+)		167,786	148,135	150,091	152,145	60,921	149,837	151,878	154,021	156,272	153,292
Operating loan prin pymts	(-)		108,463	109,013	109,013	109,013	150,210	109,013	109,013	109,013	109,013	109,013
Ending cash balance	(=)		30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Beg operating loan bal			30,000	89,323	128,444	169,522	212,654	123,364	164,188	207,053	252,061	299,320
Peak operating loan bal			138,230	175,902	215,024	256,102	251,721	209,944	250,768	293,633	338,641	385,899
End operating loan bal			89,323	128,444	169,522	212,654	123,364	164,188	207,053	252,061	299,320	343,599

Change in Working Capital

Change in cash			20,000	-	-	-	-	-	-	-	-	-
Inventory changes	(+)		1,151	-	-	-	-	-	-	-	-	-
Change in opr loan balance	(-)		59,323	39,122	41,078	43,132	-89,289	40,824	42,865	45,008	47,259	44,279
Change principal due term loans	(-)		2,122	2,263	2,349	-57,606	50,187	2,186	2,271	2,359	-2,891	-57,432
Est change in working capital	(=)		-40,294	-41,384	-43,427	14,474	39,102	-43,009	-45,136	-47,367	-44,368	13,153

Income Statement

Gross cash farm income			166,108	166,108	166,108	166,108	166,108	166,108	166,108	166,108	166,108	166,108
Inv change-income items	(+)		-	-	-	-	-	-	-	-	-	-
Gross revenue	(=)		166,108	166,108	166,108	166,108	166,108	166,108	166,108	166,108	166,108	166,108
Cash farm opr expense			103,313	101,113	101,113	101,113	101,113	101,113	101,113	101,113	101,113	101,113
Interest expense	(+)		23,308	21,984	21,677	21,381	21,503	26,492	26,348	26,220	26,111	26,022
Depreciation	(+)		39,350	35,210	31,521	28,232	44,371	39,846	35,791	32,157	28,899	25,977
Inv change-expense items	(+)		-1,151	-	-	-	-	-	-	-	-	-
Total farm expense	(=)		164,820	158,307	154,311	150,726	166,988	167,451	163,251	159,490	156,123	153,113
Net farm inc. operations			1,288	7,801	11,797	15,381	-880	-1,343	2,856	6,618	9,985	12,995
Gain/loss capital sales			-	-	-	-	-28,421	-	-	-	-	-
Debt forgiveness			-	-	-	-	-	-	-	-	-	-
NFI after extraordinary items			1,288	7,801	11,797	15,381	-29,302	-1,343	2,856	6,618	9,985	12,995

Net Worth Change

		Beg	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Net farm income			1,288	7,801	11,797	15,381	-29,302	-1,343	2,856	6,618	9,985	12,995
Personal income	(+)		40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Family living expense	(-)		60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Income taxes accrued	(-)		-	-	-	-	-	-	-	-	-	-
Earned net worth change	(=)		-18,712	-12,199	-8,203	-4,619	-49,302	-21,343	-17,144	-13,382	-10,015	-7,005

Term Debt Coverage

Net farm income from operations			1,288	7,801	11,797	15,381	-880	-1,343	2,856	6,618	9,985	12,995
Depreciation	(+)		39,350	35,210	31,521	28,232	44,371	39,846	35,791	32,157	28,899	25,977
Personal income	(+)		40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Family living expense	(-)		60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Income taxes accrued	(-)		-	-	-	-	-	-	-	-	-	-
Interest on term debt	(+)		18,165	15,993	13,730	11,381	10,789	18,799	16,614	14,343	11,984	9,532
Capital debt repayment capacity	(=)		38,803	39,004	37,048	34,994	34,280	37,302	35,261	33,117	30,867	28,504
Term debt payments			78,126	78,126	78,126	78,126	19,928	78,126	78,126	78,126	78,126	72,783
Capital debt repayment margin			-39,323	-39,122	-41,078	-43,132	14,352	-40,824	-42,865	-45,008	-47,259	-44,279
Term debt coverage ratio			0.50	0.50	0.47	0.45	1.72	0.48	0.45	0.42	0.40	0.39

Financial Standards Measures

Liquidity											
Current ratio	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Working capital	-151,161	-191,455	-232,840	-276,267	-261,792	-222,691	-265,700	-310,836	-358,203	-402,571	-389,418
Working capital to gross	-91.0 %	-115.3 %	-140.2 %	-166.3 %	-157.6 %	-134.1 %	-160.0 %	-187.1 %	-215.6 %	-242.4 %	-234.4 %
Solvency (market)											
Debt to asset ratio	84.6 %	87.2 %	88.5 %	89.4 %	89.7 %	99.5 %	103.0 %	106.1 %	108.9 %	111.3 %	113.4 %
Debt to equity ratio	5.5	6.8	7.7	8.4	8.7	214.1	n/a	n/a	n/a	n/a	n/a
Profitability (market)											
Net farm income		1,288	7,801	11,797	15,381	-29,302	-1,343	2,856	6,618	9,985	12,995
Rate of return on assets		3.8 %	5.1 %	6.1 %	7.0 %	3.5 %	4.0 %	4.9 %	5.8 %	6.8 %	7.7 %
Rate of return on equity		1.5 %	10.9 %	19.3 %	28.1 %	-3.2 %	n/a	n/a	n/a	n/a	n/a
Operating profit margin		14.1 %	17.9 %	20.2 %	22.1 %	12.4 %	15.1 %	17.6 %	19.8 %	21.7 %	23.5 %
EBITDA		62,795	64,995	64,995	64,995	64,995	64,995	64,995	64,995	64,995	64,995
Repayment Capacity											
Term debt coverage ratio (farm)		0.50	0.50	0.47	0.45	1.72	0.48	0.45	0.42	0.40	0.39
Replacement margin coverage ratio		0.50	0.50	0.47	0.45	0.59	0.48	0.45	0.42	0.40	0.39
Efficiency											
Asset turnover rate (mkt)		27.1	28.3	30.0	31.8	28.5	26.1	27.8	29.5	31.2	32.9
Operating expense ratio		62.2 %	60.9 %	60.9 %	60.9 %	60.9 %	60.9 %	60.9 %	60.9 %	60.9 %	60.9 %
Depreciation ratio		23.7 %	21.2 %	19.0 %	17.0 %	26.7 %	24.0 %	21.5 %	19.4 %	17.4 %	15.6 %
Interest expense ratio		13.3 %	13.2 %	13.0 %	12.9 %	12.9 %	15.9 %	15.9 %	15.8 %	15.7 %	15.7 %
Net farm income ratio		0.8 %	4.7 %	7.1 %	9.3 %	-0.5 %	-0.8 %	1.7 %	4.0 %	6.0 %	7.8 %
Other											
Term debt coverage (farm+personal)		0.50	0.50	0.47	0.45	1.72	0.48	0.45	0.42	0.40	0.39
Term debt to EBITDA		5.75	4.62	3.62	2.60	2.46	6.07	5.12	4.14	3.12	2.15

Shocks to Farm Term Debt Coverage Ratio

10% decrease in revenue	0.28	0.29	0.26	0.24	0.89	0.26	0.24	0.21	0.18	0.16
10% increase in expenses	0.36	0.37	0.34	0.32	1.21	0.35	0.32	0.29	0.27	0.25
3% incr. in interest rates	0.40	0.40	0.37	0.34	1.10	0.36	0.33	0.30	0.26	0.24

	Year 2018												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
CASH INFLOWS													
Beg cash bal	10000	30000	-	-	-	-	-	-	-	-	-	-	10000
Corn	-	-	-	-	-	-	-	-	-	91233	-	-	91233
Soybeans	-	-	-	-	-	-	-	-	-	-	46010	-	46010
W. Wheat	-	-	-	-	-	28864	-	-	-	-	-	-	28864
Pers. wages	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	40000
Total inflow	13333	33333	3333	3333	3333	32198	3333	3333	3333	94566	49344	3333	216108
CASH OUTFLOWS													
Seed	-	-	-	7400	-	5920	-	-	2664	-	-	-	15984
Fertilizer	-	1505	-	5401	-	-	-	4515	-	-	-	-	11421
Chemicals	-	2930	2959	2959	-	2907	-	-	-	-	-	-	11754
Crop insur.	-	-	-	2694	-	-	-	-	-	-	1258	-	3952
C. Cust hire	-	-	-	-	-	18251	-	-	-	6176	4964	-	29391
C. Labor	-	-	-	-	-	-	-	-	-	6926	7308	-	14235
Land rent	877	877	877	877	877	877	877	877	877	877	877	877	10523
RE taxes	-	-	-	-	-	222	-	-	-	-	-	-	222
Pers prop tx	-	-	-	-	-	3632	-	-	-	-	-	-	3632
Farm insur.	183	183	183	183	183	183	183	183	183	183	183	183	2200
Living/Draw	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	60000
Min end bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000
Tot. outflow	36060	10496	9019	24513	6060	36992	6060	10576	8724	19163	19590	36060	193313
Opr. surplus	-22727	22838	-5685	-21180	-2727	-4794	-2727	-7242	-5391	75404	29753	-32727	22795

	Year 2018												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
LOAN PAYMENTS													
Ford-F-250	606	606	606	606	606	606	606	606	606	606	606	606	7273
JDCC-Machi..	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	56839
FCS-HomeF..	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	14014
Tot loan pay	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	78126
Surp. or def	**-29237**	**16327**	**-12196**	**-27690**	**-9237**	**-11305**	**-9237**	**-13753**	**-11901**	**68893**	**23243**	**-39237**	**-55331**
ANNUAL OPERATING LOAN TRANSACTIONS & BALANCES													
Beg AO bal	30000	59237	42910	55106	82796	92034	103338	112575	126328	138230	69336	46094	30000
AO borrowing	29237	-	12196	27690	9237	11305	9237	13753	11901	-	-	43229	167786
AO int. pay	-	-	-	-	-	-	-	-	-	-	-	3992	3992
AO prin. pay	-	16327	-	-	-	-	-	-	-	68893	23243	-	108463
End AO bal.	**59237**	**42910**	**55106**	**82796**	**92034**	**103338**	**112575**	**126328**	**138230**	**69336**	**46094**	**89323**	**89323**
Accrued int.	125	372	551	780	1125	1509	1939	2408	2935	3511	3800	-	-
End cash bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000

2018 CROP & LIVESTOCK PRODUCTION

Enterprise	Units	Production Per Unit	Share	Operator Production
Soybeans	148.0 Acres	29.0 bu.	100	4,292 bu.
Corn	148.0 Acres	132.0 bu.	100	19,536 bu.
Wheat, Winter	148.0 Acres	33.0 bu.	100	4,884 bu.
Total crops	444 Acres			

2018 CROP & LIVESTOCK SUMMARY

		Beg	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Corn															
Produced	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Sold	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Price	$/bu.		-	-	-	-	-	-	-	-	-	4.67	-	-	4.67
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soybeans															
Produced	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Sold	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Price	$/bu.		-	-	-	-	-	-	-	-	-	-	10.72	-	10.72
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wheat, Winter															
Produced	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Sold	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Price	$/bu.		-	-	-	-	-	5.91	-	-	-	-	-	-	5.91
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	

2018 PROJECTED INVENTORY CHANGE

Commodity	Begin Inventor	$/Unit	Begin Value	Ending Inventory	$/Unit	Ending Value	Change
Accounts receivable			0			0	0
Hedging accounts			0			0	0
Other current assets			0			0	0
Total income items			0			0	0
Prepaid expenses & supplies			5,000			5,000	0
Growing crops			0			0	0
Accounts payable		(End)	75,000		(Beg)	75,000	0
Accrued interest		(End)	0		(Beg)	1,151	1,151
Total expense items			80,000			81,151	1,151
Total inventories			80,000			81,151	1,151

	Year 2019												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
CASH INFLOWS													
Beg cash bal	30000	30000	-	-	-	-	-	-	-	-	-	-	30000
Corn	-	-	-	-	-	-	-	-	-	91233	-	-	91233
Soybeans	-	-	-	-	-	-	-	-	-	-	46010	-	46010
W. Wheat	-	-	-	-	-	28864	-	-	-	-	-	-	28864
Pers. wages	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	40000
Total inflow	33333	33333	3333	3333	3333	32198	3333	3333	3333	94566	49344	3333	236108
CASH OUTFLOWS													
Seed	-	-	-	7400	-	5920	-	-	2664	-	-	-	15984
Fertilizer	-	1505	-	5401	-	-	-	4515	-	-	-	-	11421
Chemicals	-	2930	2959	2959	-	2907	-	-	-	-	-	-	11754
Crop insur.	-	-	-	2694	-	-	-	-	-	-	1258	-	3952
C. Cust hire	-	-	-	-	-	18251	-	-	-	6176	4964	-	29391
C. Labor	-	-	-	-	-	-	-	-	-	6926	7308	-	14235
Land rent	877	877	877	877	877	877	877	877	877	877	877	877	10523
RE taxes	-	-	-	-	-	222	-	-	-	-	-	-	222
Pers prop tx	-	-	-	-	-	3632	-	-	-	-	-	-	3632
Living/Draw	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	60000
Min end bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000
Tot. outflow	35877	10312	8835	24330	5877	36809	5877	10392	8541	18979	19407	35877	191113
Opr. surplus	-2544	23021	-5502	-20996	-2544	-4611	-2544	-7059	-5208	75587	29937	-32544	44995

	Year 2019												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
LOAN PAYMENTS													
Ford-F-250	606	606	606	606	606	606	606	606	606	606	606	606	7273
JDCC-Machi..	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	56839
FCS-HomeF..	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	14014
Tot loan pay	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	78126
Surp. or def	**-9054**	**16510**	**-12013**	**-27507**	**-9054**	**-11121**	**-9054**	**-13570**	**-11718**	**69077**	**23426**	**-39054**	**-33131**
ANNUAL OPERATING LOAN TRANSACTIONS & BALANCES													
Beg AO bal	89323	98377	81866	93879	121385	130439	141561	150615	164184	175902	106826	83400	89323
AO borrowing	9054	-	12013	27507	9054	11121	9054	13570	11718	-	-	45045	148135
AO int. pay	-	-	-	-	-	-	-	-	-	-	-	5991	5991
AO prin. pay	-	16510	-	-	-	-	-	-	-	69077	23426	-	109013
End AO bal.	**98377**	**81866**	**93879**	**121385**	**130439**	**141561**	**150615**	**164184**	**175902**	**106826**	**83400**	**128444**	**128444**
Accrued int.	372	782	1123	1514	2020	2564	3153	3781	4465	5198	5643	-	-
End cash bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000

2019 CROP & LIVESTOCK PRODUCTION

Enterprise	Units	Production Per Unit	Share	Operator Production
Soybeans	148.0 Acres	29.0 bu.	100	4,292 bu.
Corn	148.0 Acres	132.0 bu.	100	19,536 bu.
Wheat, Winter	148.0 Acres	33.0 bu.	100	4,884 bu.
Total crops	444 Acres			

2019 CROP & LIVESTOCK SUMMARY

		Beg	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Corn															
Produced	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Sold	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Price	$/bu.		-	-	-	-	-	-	-	-	-	4.67	-	-	4.67
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soybeans															
Produced	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Sold	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Price	$/bu.		-	-	-	-	-	-	-	-	-	-	10.72	-	10.72
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wheat, Winter															
Produced	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Sold	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Price	$/bu.		-	-	-	-	-	5.91	-	-	-	-	-	-	5.91
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	

2019 PROJECTED INVENTORY CHANGE

Commodity	Begin Inventor	$/Unit	Begin Value	Ending Inventory	$/Unit	Ending Value	Change
Accounts receivable			0			0	0
Hedging accounts			0			0	0
Other current assets			0			0	0
Total income items			0			0	0
Prepaid expenses & supplies			5,000			5,000	0
Growing crops			0			0	0
Accounts payable		(End)	75,000		(Beg)	75,000	0
Accrued interest		(End)	0		(Beg)	0	0
Total expense items			80,000			80,000	0
Total inventories			80,000			80,000	0

	Year 2020												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
CASH INFLOWS													
Beg cash bal	30000	30000	-	-	-	-	-	-	-	-	-	-	30000
Corn	-	-	-	-	-	-	-	-	-	91233	-	-	91233
Soybeans	-	-	-	-	-	-	-	-	-	-	46010	-	46010
W. Wheat	-	-	-	-	-	28864	-	-	-	-	-	-	28864
Pers. wages	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	40000
Total inflow	33333	33333	3333	3333	3333	32198	3333	3333	3333	94566	49344	3333	236108
CASH OUTFLOWS													
Seed	-	-	-	7400	-	5920	-	-	2664	-	-	-	15984
Fertilizer	-	1505	-	5401	-	-	-	4515	-	-	-	-	11421
Chemicals	-	2930	2959	2959	-	2907	-	-	-	-	-	-	11754
Crop insur.	-	-	-	2694	-	-	-	-	-	-	1258	-	3952
C. Cust hire	-	-	-	-	-	18251	-	-	-	6176	4964	-	29391
C. Labor	-	-	-	-	-	-	-	-	-	6926	7308	-	14235
Land rent	877	877	877	877	877	877	877	877	877	877	877	877	10523
RE taxes	-	-	-	-	-	222	-	-	-	-	-	-	222
Pers prop tx	-	-	-	-	-	3632	-	-	-	-	-	-	3632
Living/Draw	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	60000
Min end bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000
Tot. outflow	35877	10312	8835	24330	5877	36809	5877	10392	8541	18979	19407	35877	191113
Opr. surplus	-2544	23021	-5502	-20996	-2544	-4611	-2544	-7059	-5208	75587	29937	-32544	44995

Year 2020

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
LOAN PAYMENTS													
Ford-F-250	606	606	606	606	606	606	606	606	606	606	606	606	7273
JDCC-Machi..	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	56839
FCS-HomeF..	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	14014
Tot loan pay	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	78126
Surp. or def	**-9054**	**16510**	**-12013**	**-27507**	**-9054**	**-11121**	**-9054**	**-13570**	**-11718**	**69077**	**23426**	**-39054**	**-33131**
ANNUAL OPERATING LOAN TRANSACTIONS & BALANCES													
Beg AO bal	128444	137498	120988	133000	160507	169561	180682	189736	203306	215024	145947	122521	128444
AO borrowing	9054	-	12013	27507	9054	11121	9054	13570	11718	-	-	47001	150091
AO int. pay	-	-	-	-	-	-	-	-	-	-	-	7947	7947
AO prin. pay	-	16510	-	-	-	-	-	-	-	69077	23426	-	109013
End AO bal.	**137498**	**120988**	**133000**	**160507**	**169561**	**180682**	**189736**	**203306**	**215024**	**145947**	**122521**	**169522**	**169522**
Accrued int.	535	1108	1612	2166	2835	3542	4295	5085	5932	6828	7436	-	-
End cash bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000

2020 CROP & LIVESTOCK PRODUCTION

Enterprise	Units	Production Per Unit	Share	Operator Production
Soybeans	148.0 Acres	29.0 bu.	100	4,292 bu.
Corn	148.0 Acres	132.0 bu.	100	19,536 bu.
Wheat, Winter	148.0 Acres	33.0 bu.	100	4,884 bu.
Total crops	444 Acres			

2020 CROP & LIVESTOCK SUMMARY

		Beg	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Corn															
Produced	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Sold	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Price	$/bu.		-	-	-	-	-	-	-	-	-	4.67	-	-	4.67
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soybeans															
Produced	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Sold	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Price	$/bu.		-	-	-	-	-	-	-	-	-	-	10.72	-	10.72
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wheat, Winter															
Produced	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Sold	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Price	$/bu.		-	-	-	-	-	5.91	-	-	-	-	-	-	5.91
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	

2020 PROJECTED INVENTORY CHANGE

Commodity	Begin Inventor	$/Unit	Begin Value	Ending Inventory	$/Unit	Ending Value	Change
Accounts receivable			0			0	0
Hedging accounts			0			0	0
Other current assets			0			0	0
Total income items			0			0	0
Prepaid expenses & supplies			5,000			5,000	0
Growing crops			0			0	0
Accounts payable		(End)	75,000		(Beg)	75,000	0
Accrued interest		(End)	0		(Beg)	0	0
Total expense items			80,000			80,000	0
Total inventories			80,000			80,000	0

	Year 2021												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
CASH INFLOWS													
Beg cash bal	30000	30000	-	-	-	-	-	-	-	-	-	-	30000
Corn	-	-	-	-	-	-	-	-	-	91233	-	-	91233
Soybeans	-	-	-	-	-	-	-	-	-	-	46010	-	46010
W. Wheat	-	-	-	-	-	28864	-	-	-	-	-	-	28864
Pers. wages	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	40000
Total inflow	33333	33333	3333	3333	3333	32198	3333	3333	3333	94566	49344	3333	236108
CASH OUTFLOWS													
Seed	-	-	-	7400	-	5920	-	-	2664	-	-	-	15984
Fertilizer	-	1505	-	5401	-	-	-	4515	-	-	-	-	11421
Chemicals	-	2930	2959	2959	-	2907	-	-	-	-	-	-	11754
Crop insur.	-	-	-	2694	-	-	-	-	-	-	1258	-	3952
C. Cust hire	-	-	-	-	-	18251	-	-	-	6176	4964	-	29391
C. Labor	-	-	-	-	-	-	-	-	-	6926	7308	-	14235
Land rent	877	877	877	877	877	877	877	877	877	877	877	877	10523
RE taxes	-	-	-	-	-	222	-	-	-	-	-	-	222
Pers prop tx	-	-	-	-	-	3632	-	-	-	-	-	-	3632
Living/Draw	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	60000
Min end bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000
Tot. outflow	35877	10312	8835	24330	5877	36809	5877	10392	8541	18979	19407	35877	191113
Opr. surplus	-2544	23021	-5502	-20996	-2544	-4611	-2544	-7059	-5208	75587	29937	-32544	44995

	Year 2021												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
LOAN PAYMENTS													
Ford-F-250	606	606	606	606	606	606	606	606	606	606	606	606	7273
JDCC-Machi..	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	56839
FCS-HomeF..	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	14014
Tot loan pay	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	78126
Surp. or def	**-9054**	**16510**	**-12013**	**-27507**	**-9054**	**-11121**	**-9054**	**-13570**	**-11718**	**69077**	**23426**	**-39054**	**-33131**
ANNUAL OPERATING LOAN TRANSACTIONS & BALANCES													
Beg AO bal	169522	178576	162066	174078	201585	210639	221760	230814	244384	256102	187025	163599	169522
AO borrowing	9054	-	12013	27507	9054	11121	9054	13570	11718	-	-	49055	152145
AO int. pay	-	-	-	-	-	-	-	-	-	-	-	10001	10001
AO prin. pay	-	16510	-	-	-	-	-	-	-	69077	23426	-	109013
End AO bal.	**178576**	**162066**	**174078**	**201585**	**210639**	**221760**	**230814**	**244384**	**256102**	**187025**	**163599**	**212654**	**212654**
Accrued int.	706	1450	2126	2851	3691	4569	5493	6454	7473	8540	9319	-	-
End cash bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000

2021 CROP & LIVESTOCK PRODUCTION

Enterprise	Units	Production Per Unit	Share	Operator Production
Soybeans	148.0 Acres	29.0 bu.	100	4,292 bu.
Corn	148.0 Acres	132.0 bu.	100	19,536 bu.
Wheat, Winter	148.0 Acres	33.0 bu.	100	4,884 bu.
Total crops	444 Acres			

2021 CROP & LIVESTOCK SUMMARY

		Beg	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Corn															
Produced	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Sold	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Price	$/bu.		-	-	-	-	-	-	-	-	-	4.67	-	-	4.67
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soybeans															
Produced	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Sold	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Price	$/bu.		-	-	-	-	-	-	-	-	-	-	10.72	-	10.72
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wheat, Winter															
Produced	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Sold	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Price	$/bu.		-	-	-	-	-	5.91	-	-	-	-	-	-	5.91
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	

2021 PROJECTED INVENTORY CHANGE

Commodity	Begin Inventor	$/Unit	Begin Value	Ending Inventory	$/Unit	Ending Value	Change
Accounts receivable			0			0	0
Hedging accounts			0			0	0
Other current assets			0			0	0
Total income items			0			0	0
Prepaid expenses & supplies			5,000			5,000	0
Growing crops			0			0	0
Accounts payable		(End)	75,000		(Beg)	75,000	0
Accrued interest		(End)	0		(Beg)	0	0
Total expense items			80,000			80,000	0
Total inventories			80,000			80,000	0

	Year 2022												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
CASH INFLOWS													
Beg cash bal	30000	30000	-	-	-	-	-	-	-	-	-	-	30000
Corn	-	-	-	-	-	-	-	-	-	91233	-	-	91233
Soybeans	-	-	-	-	-	-	-	-	-	-	46010	-	46010
W. Wheat	-	-	-	-	-	28864	-	-	-	-	-	-	28864
Pers. wages	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	40000
Total inflow	33333	33333	3333	3333	3333	32198	3333	3333	3333	94566	49344	3333	236108
CASH OUTFLOWS													
Seed	-	-	-	7400	-	5920	-	-	2664	-	-	-	15984
Fertilizer	-	1505	-	5401	-	-	-	4515	-	-	-	-	11421
Chemicals	-	2930	2959	2959	-	2907	-	-	-	-	-	-	11754
Crop insur.	-	-	-	2694	-	-	-	-	-	-	1258	-	3952
C. Cust hire	-	-	-	-	-	18251	-	-	-	6176	4964	-	29391
C. Labor	-	-	-	-	-	-	-	-	-	6926	7308	-	14235
Land rent	877	877	877	877	877	877	877	877	877	877	877	877	10523
RE taxes	-	-	-	-	-	222	-	-	-	-	-	-	222
Pers prop tx	-	-	-	-	-	3632	-	-	-	-	-	-	3632
Living/Draw	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	60000
Min end bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000
Tot. outflow	35877	10312	8835	24330	5877	36809	5877	10392	8541	18979	19407	35877	191113
Opr. surplus	-2544	23021	-5502	-20996	-2544	-4611	-2544	-7059	-5208	75587	29937	-32544	44995

	Year 2022												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
CAPITAL PURCHASES													
JD8245R	-	-	-	-	-	-	-	-	-	-	-	256473	256473
JD1755	-	-	-	-	-	-	-	-	-	-	-	29000	29000
JD1590	-	-	-	-	-	-	-	-	-	-	-	42000	42000
Pickup	-	-	-	-	-	-	-	-	-	-	-	35685	35685
Tot. cap pur	-	-	-	-	-	-	-	-	-	-	-	363158	363158
CAPITAL SALES													
JD8245R	-	-	-	-	-	-	-	-	-	-	-	100000	100000
JD1755	-	-	-	-	-	-	-	-	-	-	-	13000	13000
JD1590	-	-	-	-	-	-	-	-	-	-	-	20000	20000
Pickup	-	-	-	-	-	-	-	-	-	-	-	11000	11000
Tot cap sale	-	-	-	-	-	-	-	-	-	-	-	144000	144000
NEW CREDIT													
Ford-F-250	-	-	-	-	-	-	-	-	-	-	-	32117	32117
JDCC-Machi..	-	-	-	-	-	-	-	-	-	-	-	261978	261978
Tot new cred	-	-	-	-	-	-	-	-	-	-	-	294095	294095
LOAN PAYMENTS													
Ford-F-250	97	-	-	-	-	-	-	-	-	-	-	606	703
JDCC-Machi..	475	-	-	-	-	-	-	-	-	-	-	4737	5211
FCS-HomeF..	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	14014
Tot loan pay	1740	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	6510	19928
Surp. or def	**-4283**	**21853**	**-6670**	**-22164**	**-3711**	**-5779**	**-3711**	**-8227**	**-6375**	**74419**	**28769**	**35883**	**100003**
ANNUAL OPERATING LOAN TRANSACTIONS & BALANCES													
Beg AO bal	212654	216937	195084	201753	223917	227629	233407	237119	245346	251721	177302	148533	212654
AO borrowing	4283	-	6670	22164	3711	5779	3711	8227	6375	-	-	-	60921
AO int. pay	-	-	-	-	-	-	-	-	-	-	-	10714	10714
AO prin. pay	-	21853	-	-	-	-	-	-	-	74419	28769	25169	150210
End AO bal.	**216937**	**195084**	**201753**	**223917**	**227629**	**233407**	**237119**	**245346**	**251721**	**177302**	**148533**	**123364**	**123364**
Accrued int.	886	1790	2603	3443	4376	5325	6297	7285	8308	9357	10095	-	-
End cash bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000

2022 CROP & LIVESTOCK PRODUCTION

Enterprise	Units	Production Per Unit	Share	Operator Production
Soybeans	148.0 Acres	29.0 bu.	100	4,292 bu.
Corn	148.0 Acres	132.0 bu.	100	19,536 bu.
Wheat, Winter	148.0 Acres	33.0 bu.	100	4,884 bu.
Total crops	444 Acres			

2022 CROP & LIVESTOCK SUMMARY

		Beg	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Corn															
Produced	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Sold	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Price	$/bu.		-	-	-	-	-	-	-	-	-	4.67	-	-	4.67
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soybeans															
Produced	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Sold	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Price	$/bu.		-	-	-	-	-	-	-	-	-	-	10.72	-	10.72
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wheat, Winter															
Produced	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Sold	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Price	$/bu.		-	-	-	-	-	5.91	-	-	-	-	-	-	5.91
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	

2022 PROJECTED INVENTORY CHANGE

Commodity	Begin Inventor	$/Unit	Begin Value	Ending Inventory	$/Unit	Ending Value	Change
Accounts receivable			0			0	0
Hedging accounts			0			0	0
Other current assets			0			0	0
Total income items			0			0	0
Prepaid expenses & supplies			5,000			5,000	0
Growing crops			0			0	0
Accounts payable		(End)	75,000		(Beg)	75,000	0
Accrued interest		(End)	0		(Beg)	0	0
Total expense items			80,000			80,000	0
Total inventories			80,000			80,000	0

	Year 2023												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
CASH INFLOWS													
Beg cash bal	30000	30000	-	-	-	-	-	-	-	-	-	-	30000
Corn	-	-	-	-	-	-	-	-	-	91233	-	-	91233
Soybeans	-	-	-	-	-	-	-	-	-	-	46010	-	46010
W. Wheat	-	-	-	-	-	28864	-	-	-	-	-	-	28864
Pers. wages	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	40000
Total inflow	33333	33333	3333	3333	3333	32198	3333	3333	3333	94566	49344	3333	236108
CASH OUTFLOWS													
Seed	-	-	-	7400	-	5920	-	-	2664	-	-	-	15984
Fertilizer	-	1505	-	5401	-	-	-	4515	-	-	-	-	11421
Chemicals	-	2930	2959	2959	-	2907	-	-	-	-	-	-	11754
Crop insur.	-	-	-	2694	-	-	-	-	-	-	1258	-	3952
C. Cust hire	-	-	-	-	-	18251	-	-	-	6176	4964	-	29391
C. Labor	-	-	-	-	-	-	-	-	-	6926	7308	-	14235
Land rent	877	877	877	877	877	877	877	877	877	877	877	877	10523
RE taxes	-	-	-	-	-	222	-	-	-	-	-	-	222
Pers prop tx	-	-	-	-	-	3632	-	-	-	-	-	-	3632
Living/Draw	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	60000
Min end bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000
Tot. outflow	35877	10312	8835	24330	5877	36809	5877	10392	8541	18979	19407	35877	191113
Opr. surplus	-2544	23021	-5502	-20996	-2544	-4611	-2544	-7059	-5208	75587	29937	-32544	44995

Year 2023

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
LOAN PAYMENTS													
Ford-F-250	606	606	606	606	606	606	606	606	606	606	606	606	7273
JDCC-Machi..	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	56839
FCS-HomeF..	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	14014
Tot loan pay	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	78126
Surp. or def	**-9054**	**16510**	**-12013**	**-27507**	**-9054**	**-11121**	**-9054**	**-13570**	**-11718**	**69077**	**23426**	**-39054**	**-33131**
ANNUAL OPERATING LOAN TRANSACTIONS & BALANCES													
Beg AO bal	123364	132418	115908	127921	155427	164481	175602	184657	198226	209944	140867	117441	123364
AO borrowing	9054	-	12013	27507	9054	11121	9054	13570	11718	-	-	46747	149837
AO int. pay	-	-	-	-	-	-	-	-	-	-	-	7693	7693
AO prin. pay	-	16510	-	-	-	-	-	-	-	69077	23426	-	109013
End AO bal.	**132418**	**115908**	**127921**	**155427**	**164481**	**175602**	**184657**	**198226**	**209944**	**140867**	**117441**	**164188**	**164188**
Accrued int.	514	1066	1549	2082	2729	3415	4146	4916	5742	6616	7203	-	-
End cash bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000

2023 CROP & LIVESTOCK PRODUCTION

Enterprise	Units	Production Per Unit	Share	Operator Production
Soybeans	148.0 Acres	29.0 bu.	100	4,292 bu.
Corn	148.0 Acres	132.0 bu.	100	19,536 bu.
Wheat, Winter	148.0 Acres	33.0 bu.	100	4,884 bu.
Total crops	444 Acres			

2023 CROP & LIVESTOCK SUMMARY

		Beg	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Corn															
Produced	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Sold	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Price	$/bu.		-	-	-	-	-	-	-	-	-	4.67	-	-	4.67
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soybeans															
Produced	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Sold	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Price	$/bu.		-	-	-	-	-	-	-	-	-	-	10.72	-	10.72
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wheat, Winter															
Produced	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Sold	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Price	$/bu.		-	-	-	-	-	5.91	-	-	-	-	-	-	5.91
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	

2023 PROJECTED INVENTORY CHANGE

Commodity	Begin Inventor	$/Unit	Begin Value	Ending Inventory	$/Unit	Ending Value	Change
Accounts receivable			0			0	0
Hedging accounts			0			0	0
Other current assets			0			0	0
Total income items			0			0	0
Prepaid expenses & supplies			5,000			5,000	0
Growing crops			0			0	0
Accounts payable		(End)	75,000		(Beg)	75,000	0
Accrued interest		(End)	0		(Beg)	0	0
Total expense items			80,000			80,000	0
Total inventories			80,000			80,000	0

	Year 2024												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
CASH INFLOWS													
Beg cash bal	30000	30000	-	-	-	-	-	-	-	-	-	-	30000
Corn	-	-	-	-	-	-	-	-	-	91233	-	-	91233
Soybeans	-	-	-	-	-	-	-	-	-	-	46010	-	46010
W. Wheat	-	-	-	-	-	28864	-	-	-	-	-	-	28864
Pers. wages	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	40000
Total inflow	33333	33333	3333	3333	3333	32198	3333	3333	3333	94566	49344	3333	236108
CASH OUTFLOWS													
Seed	-	-	-	7400	-	5920	-	-	2664	-	-	-	15984
Fertilizer	-	1505	-	5401	-	-	-	4515	-	-	-	-	11421
Chemicals	-	2930	2959	2959	-	2907	-	-	-	-	-	-	11754
Crop insur.	-	-	-	2694	-	-	-	-	-	-	1258	-	3952
C. Cust hire	-	-	-	-	-	18251	-	-	-	6176	4964	-	29391
C. Labor	-	-	-	-	-	-	-	-	-	6926	7308	-	14235
Land rent	877	877	877	877	877	877	877	877	877	877	877	877	10523
RE taxes	-	-	-	-	-	222	-	-	-	-	-	-	222
Pers prop tx	-	-	-	-	-	3632	-	-	-	-	-	-	3632
Living/Draw	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	60000
Min end bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000
Tot. outflow	35877	10312	8835	24330	5877	36809	5877	10392	8541	18979	19407	35877	191113
Opr. surplus	-2544	23021	-5502	-20996	-2544	-4611	-2544	-7059	-5208	75587	29937	-32544	44995

	Year 2024												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
LOAN PAYMENTS													
Ford-F-250	606	606	606	606	606	606	606	606	606	606	606	606	7273
JDCC-Machi..	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	56839
FCS-HomeF..	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	14014
Tot loan pay	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	78126
Surp. or def	**-9054**	**16510**	**-12013**	**-27507**	**-9054**	**-11121**	**-9054**	**-13570**	**-11718**	**69077**	**23426**	**-39054**	**-33131**
ANNUAL OPERATING LOAN TRANSACTIONS & BALANCES													
Beg AO bal	164188	173242	156732	168744	196251	205305	216426	225480	239050	250768	181691	158265	164188
AO borrowing	9054	-	12013	27507	9054	11121	9054	13570	11718	-	-	48788	151878
AO int. pay	-	-	-	-	-	-	-	-	-	-	-	9734	9734
AO prin. pay	-	16510	-	-	-	-	-	-	-	69077	23426	-	109013
End AO bal.	**173242**	**156732**	**168744**	**196251**	**205305**	**216426**	**225480**	**239050**	**250768**	**181691**	**158265**	**207053**	**207053**
Accrued int.	684	1406	2059	2762	3580	4435	5337	6277	7273	8317	9074	-	-
End cash bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000

2024 CROP & LIVESTOCK PRODUCTION

Enterprise	Units	Production Per Unit	Share	Operator Production
Soybeans	148.0 Acres	29.0 bu.	100	4,292 bu.
Corn	148.0 Acres	132.0 bu.	100	19,536 bu.
Wheat, Winter	148.0 Acres	33.0 bu.	100	4,884 bu.
Total crops	444 Acres			

2024 CROP & LIVESTOCK SUMMARY

		Beg	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
Corn															
Produced	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Sold	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Price	$/bu.		-	-	-	-	-	-	-	-	-	4.67	-	-	4.67
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soybeans															
Produced	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Sold	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Price	$/bu.		-	-	-	-	-	-	-	-	-	-	10.72	-	10.72
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wheat, Winter															
Produced	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Sold	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Price	$/bu.		-	-	-	-	-	5.91	-	-	-	-	-	-	5.91
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	

2024 PROJECTED INVENTORY CHANGE

Commodity	Begin Inventor	$/Unit	Begin Value	Ending Inventory	$/Unit	Ending Value	Change
Accounts receivable			0			0	0
Hedging accounts			0			0	0
Other current assets			0			0	0
Total income items			0			0	0
Prepaid expenses & supplies			5,000			5,000	0
Growing crops			0			0	0
Accounts payable		(End)	75,000		(Beg)	75,000	0
Accrued interest		(End)	0		(Beg)	0	0
Total expense items			80,000			80,000	0
Total inventories			80,000			80,000	0

	Year 2025												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
CASH INFLOWS													
Beg cash bal	30000	30000	-	-	-	-	-	-	-	-	-	-	30000
Corn	-	-	-	-	-	-	-	-	-	91233	-	-	91233
Soybeans	-	-	-	-	-	-	-	-	-	-	46010	-	46010
W. Wheat	-	-	-	-	-	28864	-	-	-	-	-	-	28864
Pers. wages	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	40000
Total inflow	33333	33333	3333	3333	3333	32198	3333	3333	3333	94566	49344	3333	236108
CASH OUTFLOWS													
Seed	-	-	-	7400	-	5920	-	-	2664	-	-	-	15984
Fertilizer	-	1505	-	5401	-	-	-	4515	-	-	-	-	11421
Chemicals	-	2930	2959	2959	-	2907	-	-	-	-	-	-	11754
Crop insur.	-	-	-	2694	-	-	-	-	-	-	1258	-	3952
C. Cust hire	-	-	-	-	-	18251	-	-	-	6176	4964	-	29391
C. Labor	-	-	-	-	-	-	-	-	-	6926	7308	-	14235
Land rent	877	877	877	877	877	877	877	877	877	877	877	877	10523
RE taxes	-	-	-	-	-	222	-	-	-	-	-	-	222
Pers prop tx	-	-	-	-	-	3632	-	-	-	-	-	-	3632
Living/Draw	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	60000
Min end bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000
Tot. outflow	35877	10312	8835	24330	5877	36809	5877	10392	8541	18979	19407	35877	191113
Opr. surplus	-2544	23021	-5502	-20996	-2544	-4611	-2544	-7059	-5208	75587	29937	-32544	44995

	Year 2025												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
LOAN PAYMENTS													
Ford-F-250	606	606	606	606	606	606	606	606	606	606	606	606	7273
JDCC-Machi..	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	56839
FCS-HomeF..	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	14014
Tot loan pay	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	78126
Surp. or def	**-9054**	**16510**	**-12013**	**-27507**	**-9054**	**-11121**	**-9054**	**-13570**	**-11718**	**69077**	**23426**	**-39054**	**-33131**
ANNUAL OPERATING LOAN TRANSACTIONS & BALANCES													
Beg AO bal	207053	216107	199597	211609	239116	248170	259291	268345	281915	293633	224556	201130	207053
AO borrowing	9054	-	12013	27507	9054	11121	9054	13570	11718	-	-	50931	154021
AO int. pay	-	-	-	-	-	-	-	-	-	-	-	11877	11877
AO prin. pay	-	16510	-	-	-	-	-	-	-	69077	23426	-	109013
End AO bal.	**216107**	**199597**	**211609**	**239116**	**248170**	**259291**	**268345**	**281915**	**293633**	**224556**	**201130**	**252061**	**252061**
Accrued int.	863	1763	2595	3477	4473	5507	6587	7705	8880	10103	11039	-	-
End cash bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000

2025 CROP & LIVESTOCK PRODUCTION

Enterprise	Units	Production Per Unit	Share	Operator Production
Soybeans	148.0 Acres	29.0 bu.	100	4,292 bu.
Corn	148.0 Acres	132.0 bu.	100	19,536 bu.
Wheat, Winter	148.0 Acres	33.0 bu.	100	4,884 bu.
Total crops	444 Acres			

2025 CROP & LIVESTOCK SUMMARY

		Beg	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Corn															
Produced	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Sold	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Price	$/bu.		-	-	-	-	-	-	-	-	-	4.67	-	-	4.67
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soybeans															
Produced	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Sold	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Price	$/bu.		-	-	-	-	-	-	-	-	-	-	10.72	-	10.72
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wheat, Winter															
Produced	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Sold	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Price	$/bu.		-	-	-	-	-	5.91	-	-	-	-	-	-	5.91
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	

2025 PROJECTED INVENTORY CHANGE

Commodity	Begin Inventor	$/Unit	Begin Value	Ending Inventory	$/Unit	Ending Value	Change
Accounts receivable			0			0	0
Hedging accounts			0			0	0
Other current assets			0			0	0
Total income items			0			0	0
Prepaid expenses & supplies			5,000			5,000	0
Growing crops			0			0	0
Accounts payable		(End)	75,000		(Beg)	75,000	0
Accrued interest		(End)	0		(Beg)	0	0
Total expense items			80,000			80,000	0
Total inventories			80,000			80,000	0

	Year 2026												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
CASH INFLOWS													
Beg cash bal	30000	30000	-	-	-	-	-	-	-	-	-	-	30000
Corn	-	-	-	-	-	-	-	-	-	91233	-	-	91233
Soybeans	-	-	-	-	-	-	-	-	-	-	46010	-	46010
W. Wheat	-	-	-	-	-	28864	-	-	-	-	-	-	28864
Pers. wages	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	40000
Total inflow	33333	33333	3333	3333	3333	32198	3333	3333	3333	94566	49344	3333	236108
CASH OUTFLOWS													
Seed	-	-	-	7400	-	5920	-	-	2664	-	-	-	15984
Fertilizer	-	1505	-	5401	-	-	-	4515	-	-	-	-	11421
Chemicals	-	2930	2959	2959	-	2907	-	-	-	-	-	-	11754
Crop insur.	-	-	-	2694	-	-	-	-	-	-	1258	-	3952
C. Cust hire	-	-	-	-	-	18251	-	-	-	6176	4964	-	29391
C. Labor	-	-	-	-	-	-	-	-	-	6926	7308	-	14235
Land rent	877	877	877	877	877	877	877	877	877	877	877	877	10523
RE taxes	-	-	-	-	-	222	-	-	-	-	-	-	222
Pers prop tx	-	-	-	-	-	3632	-	-	-	-	-	-	3632
Living/Draw	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	60000
Min end bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000
Tot. outflow	35877	10312	8835	24330	5877	36809	5877	10392	8541	18979	19407	35877	191113
Opr. surplus	-2544	23021	-5502	-20996	-2544	-4611	-2544	-7059	-5208	75587	29937	-32544	44995

	Year 2026												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
LOAN PAYMENTS													
Ford-F-250	606	606	606	606	606	606	606	606	606	606	606	606	7273
JDCC-Machi..	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	56839
FCS-HomeF..	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	14014
Tot loan pay	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	78126
Surp. or def	**-9054**	**16510**	**-12013**	**-27507**	**-9054**	**-11121**	**-9054**	**-13570**	**-11718**	**69077**	**23426**	**-39054**	**-33131**
ANNUAL OPERATING LOAN TRANSACTIONS & BALANCES													
Beg AO bal	252061	261115	244605	256617	284124	293178	304299	313353	326923	338641	269564	246138	252061
AO borrowing	9054	-	12013	27507	9054	11121	9054	13570	11718	-	-	53182	156272
AO int. pay	-	-	-	-	-	-	-	-	-	-	-	14128	14128
AO prin. pay	-	16510	-	-	-	-	-	-	-	69077	23426	-	109013
End AO bal.	**261115**	**244605**	**256617**	**284124**	**293178**	**304299**	**313353**	**326923**	**338641**	**269564**	**246138**	**299320**	**299320**
Accrued int.	1050	2138	3157	4227	5411	6632	7900	9206	10568	11979	13102	-	-
End cash bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000

2026 CROP & LIVESTOCK PRODUCTION

Enterprise	Units	Production Per Unit	Share	Operator Production
Soybeans	148.0 Acres	29.0 bu.	100	4,292 bu.
Corn	148.0 Acres	132.0 bu.	100	19,536 bu.
Wheat, Winter	148.0 Acres	33.0 bu.	100	4,884 bu.
Total crops	444 Acres			

2026 CROP & LIVESTOCK SUMMARY

		Beg	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Corn															
Produced	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Sold	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Price	$/bu.		-	-	-	-	-	-	-	-	-	4.67	-	-	4.67
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soybeans															
Produced	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Sold	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Price	$/bu.		-	-	-	-	-	-	-	-	-	-	10.72	-	10.72
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wheat, Winter															
Produced	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Sold	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Price	$/bu.		-	-	-	-	-	5.91	-	-	-	-	-	-	5.91
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	

2026 PROJECTED INVENTORY CHANGE

Commodity	Begin Inventor	$/Unit	Begin Value	Ending Inventory	$/Unit	Ending Value	Change
Accounts receivable			0			0	0
Hedging accounts			0			0	0
Other current assets			0			0	0
Total income items			0			0	0
Prepaid expenses & supplies			5,000			5,000	0
Growing crops			0			0	0
Accounts payable		(End)	75,000		(Beg)	75,000	0
Accrued interest		(End)	0		(Beg)	0	0
Total expense items			80,000			80,000	0
Total inventories			80,000			80,000	0

	Year 2027												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
CASH INFLOWS													
Beg cash bal	30000	30000	-	-	-	-	-	-	-	-	-	-	30000
Corn	-	-	-	-	-	-	-	-	-	91233	-	-	91233
Soybeans	-	-	-	-	-	-	-	-	-	-	46010	-	46010
W. Wheat	-	-	-	-	-	28864	-	-	-	-	-	-	28864
Pers. wages	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	3333	40000
Total inflow	33333	33333	3333	3333	3333	32198	3333	3333	3333	94566	49344	3333	236108
CASH OUTFLOWS													
Seed	-	-	-	7400	-	5920	-	-	2664	-	-	-	15984
Fertilizer	-	1505	-	5401	-	-	-	4515	-	-	-	-	11421
Chemicals	-	2930	2959	2959	-	2907	-	-	-	-	-	-	11754
Crop insur.	-	-	-	2694	-	-	-	-	-	-	1258	-	3952
C. Cust hire	-	-	-	-	-	18251	-	-	-	6176	4964	-	29391
C. Labor	-	-	-	-	-	-	-	-	-	6926	7308	-	14235
Land rent	877	877	877	877	877	877	877	877	877	877	877	877	10523
RE taxes	-	-	-	-	-	222	-	-	-	-	-	-	222
Pers prop tx	-	-	-	-	-	3632	-	-	-	-	-	-	3632
Living/Draw	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	60000
Min end bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000
Tot. outflow	35877	10312	8835	24330	5877	36809	5877	10392	8541	18979	19407	35877	191113
Opr. surplus	-2544	23021	-5502	-20996	-2544	-4611	-2544	-7059	-5208	75587	29937	-32544	44995

	Year 2027												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
LOAN PAYMENTS													
Ford-F-250	606	606	606	606	606	606	606	606	606	606	606	0	6667
JDCC-Machi..	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	0	52102
FCS-HomeF..	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	1168	14014
Tot loan pay	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	6510	1168	72783
Surp. or def	**-9054**	**16510**	**-12013**	**-27507**	**-9054**	**-11121**	**-9054**	**-13570**	**-11718**	**69077**	**23426**	**-33711**	**-27788**
ANNUAL OPERATING LOAN TRANSACTIONS & BALANCES													
Beg AO bal	299320	308374	291863	303876	331383	340437	351558	360612	374181	385899	316823	293397	299320
AO borrowing	9054	-	12013	27507	9054	11121	9054	13570	11718	-	-	50202	153292
AO int. pay	-	-	-	-	-	-	-	-	-	-	-	16491	16491
AO prin. pay	-	16510	-	-	-	-	-	-	-	69077	23426	-	109013
End AO bal.	**308374**	**291863**	**303876**	**331383**	**340437**	**351558**	**360612**	**374181**	**385899**	**316823**	**293397**	**343599**	**343599**
Accrued int.	1247	2532	3748	5014	6395	7814	9278	10781	12340	13948	15268	-	-
End cash bal	30000	-	-	-	-	-	-	-	-	-	-	30000	30000

2027 CROP & LIVESTOCK PRODUCTION

Enterprise	Units	Production Per Unit	Share	Operator Production
Soybeans	148.0 Acres	29.0 bu.	100	4,292 bu.
Corn	148.0 Acres	132.0 bu.	100	19,536 bu.
Wheat, Winter	148.0 Acres	33.0 bu.	100	4,884 bu.
Total crops	444 Acres			

2027 CROP & LIVESTOCK SUMMARY

		Beg	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Corn															
Produced	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Sold	bu.		-	-	-	-	-	-	-	-	-	19536	-	-	19536
Price	$/bu.		-	-	-	-	-	-	-	-	-	4.67	-	-	4.67
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soybeans															
Produced	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Sold	bu.		-	-	-	-	-	-	-	-	-	-	4292	-	4292
Price	$/bu.		-	-	-	-	-	-	-	-	-	-	10.72	-	10.72
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wheat, Winter															
Produced	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Sold	bu.		-	-	-	-	-	4884	-	-	-	-	-	-	4884
Price	$/bu.		-	-	-	-	-	5.91	-	-	-	-	-	-	5.91
Inventory	bu.	-	-	-	-	-	-	-	-	-	-	-	-	-	

2027 PROJECTED INVENTORY CHANGE

Commodity	Begin Inventor	$/Unit	Begin Value	Ending Inventory	$/Unit	Ending Value	Change
Accounts receivable			0			0	0
Hedging accounts			0			0	0
Other current assets			0			0	0
Total income items			0			0	0
Prepaid expenses & supplies			5,000			5,000	0
Growing crops			0			0	0
Accounts payable		(End)	75,000		(Beg)	75,000	0
Accrued interest		(End)	0		(Beg)	0	0
Total expense items			80,000			80,000	0
Total inventories			80,000			80,000	0

BALANCE SHEETS

		Projected									
	1/1/2018	1/1/2019	1/1/2020	1/1/2021	1/1/2022	1/1/2023	1/1/2024	1/1/2025	1/1/2026	1/1/2027	1/1/2028
ASSETS											
Current Assets											
Cash and checking	10,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Prepaid exp. & suppl.	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Total current assets	15,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000
Intermediate Assets											
Machinery	327,473	294,726	265,253	238,728	214,855	365,033	328,529	295,676	266,109	239,498	215,548
Titled vehicles	35,685	30,332	25,782	21,915	18,628	15,834	13,459	11,440	9,724	8,265	7,025
Total intermediate assets	363,158	325,058	291,036	260,643	233,483	380,866	341,988	307,116	275,833	247,763	222,574
Long Term Assets											
Land	220,002	220,002	220,002	220,002	220,002	220,002	220,002	220,002	220,002	220,002	220,002
Bldgs & improve.	25,000	23,750	22,563	21,434	20,363	19,345	18,377	17,458	16,586	15,756	14,968
Total long term assets	245,002	243,752	242,565	241,436	240,365	239,347	238,379	237,460	236,588	235,758	234,970
Total farm assets	623,160	603,810	568,600	537,079	508,847	655,213	615,367	579,577	547,420	518,521	492,544
Personal assets	260,000	260,000	260,000	260,000	260,000	260,000	260,000	260,000	260,000	260,000	260,000
Total assets	883,160	863,810	828,600	797,079	768,847	915,213	875,367	839,577	807,420	778,521	752,544
LIABILITIES											
Current Liabilities											
Accrued interest	1,151	-	-	-	-	-	-	-	-	-	-
Prin due on term loans	60,011	62,133	64,395	66,745	9,139	59,326	61,512	63,783	66,142	63,251	5,819
Operating loan(s)	30,000	89,323	128,444	169,522	212,654	123,364	164,188	207,053	252,061	299,320	343,599
Payables & accr exp	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Total current liabilities	166,161	226,455	267,840	311,267	296,792	257,691	300,700	345,836	393,203	437,571	424,418
Intermediate Liabilities											
JDCC-Machinery	162,258	110,362	56,309	474	-4,027	208,768	157,961	105,479	51,265	-	-
Ford Credit-F-250	20,222	13,902	7,171	96	-472	25,821	19,700	13,266	6,503	-	-
Total inter. liabilities	182,481	124,264	63,481	570	-4,499	234,589	177,662	118,745	57,769	-	-
Long Term Liabilities											
FCS-Home Farm	178,437	175,722	172,110	168,276	164,206	159,887	155,302	150,436	145,271	139,789	133,970
Total long term liab.	178,437	175,722	172,110	168,276	164,206	159,887	155,302	150,436	145,271	139,789	133,970
Total farm liabilities	527,079	526,441	503,430	480,113	456,499	652,166	633,664	615,017	596,243	577,359	558,387
Personal liabilities	-	-	-	-	-	-	-	-	-	-	-
Total liabilities	527,079	526,441	503,430	480,113	456,499	652,166	633,664	615,017	596,243	577,359	558,387
Net worth	356,081	337,369	325,170	316,967	312,348	263,046	241,703	224,560	211,178	201,162	194,157
Net worth change		-18,712	-12,199	-8,203	-4,619	-49,302	-21,343	-17,144	-13,382	-10,015	-7,005
Total debt to asset ratio	59 %	60 %	60 %	60 %	59 %	71 %	72 %	73 %	73 %	74 %	74 %

Financial Trends

	2018	***2019***	***2020***	***2021***	***2022***	***2023***	***2024***	***2025***
Source	Proj.	Proj.	Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Income Statement								
Gross cash farm income	166,108	166,108	166,108	166,108	166,108	166,108	166,108	166,108
= Gross farm income (accrual)	166,108	166,108	166,108	166,108	166,108	166,108	166,108	166,108
Total cash farm expense	126,621	123,097	122,790	122,495	122,617	127,605	127,461	127,333
+ Depreciation	39,350	35,210	31,521	28,232	44,371	39,846	35,791	32,157
+ Inventory change (expense items)	-1,151	-	-	-	-	-	-	-
= Total farm expense (accrual)	164,820	158,307	154,311	150,726	166,988	167,451	163,251	159,490
Net farm income from operations	1,288	7,801	11,797	15,381	-880	-1,343	2,856	6,618
Gain or loss from capital sales	-	-	-	-	-28,421	-	-	-
Net farm income	**1,288**	**7,801**	**11,797**	**15,381**	**-29,302**	**-1,343**	**2,856**	**6,618**
Profitability (market)								
Rate of return on assets	3.8 %	5.1 %	6.1 %	7.0 %	3.5 %	4.0 %	4.9 %	5.8 %
Rate of return on equity	1.5 %	10.9 %	19.3 %	28.1 %	-3.2 %	n/a	n/a	n/a
Operating profit margin	14.1 %	17.9 %	20.2 %	22.1 %	12.4 %	15.1 %	17.6 %	19.8 %
Asset turnover rate	27.1 %	28.3 %	30.0 %	31.8 %	28.5 %	26.1 %	27.8 %	29.5 %
Liquidity & Repayment								
Current ratio (farm only)	0.15	0.13	0.11	0.12	0.14	0.12	0.10	0.09
Working capital (farm only)	-191,455	-232,840	-276,267	-261,792	-222,691	-265,700	-310,836	-358,203
Working capital to gross revenue	-115.3 %	-140.2 %	-166.3 %	-157.6 %	-134.1 %	-160.0 %	-187.1 %	-215.6 %
Term debt coverage ratio	0.50	0.50	0.47	0.45	1.72	0.48	0.45	0.42
Replacement margin coverage ratio	0.50	0.50	0.47	0.45	0.59	0.48	0.45	0.42
Efficiency Measures								
Operating expense ratio	62.2 %	60.9 %	60.9 %	60.9 %	60.9 %	60.9 %	60.9 %	60.9 %
Depreciation expense ratio	23.7 %	21.2 %	19.0 %	17.0 %	26.7 %	24.0 %	21.5 %	19.4 %
Interest expense ratio	13.3 %	13.2 %	13.0 %	12.9 %	12.9 %	15.9 %	15.9 %	15.8 %
Solvency (market, exclude def liab)								
Farm assets	603,810	568,600	537,079	508,847	655,213	615,367	579,577	547,420
Farm liabilities	526,441	503,430	480,113	456,499	652,166	633,664	615,017	596,243
Total assets	863,810	828,600	797,079	768,847	915,213	875,367	839,577	807,420
Total liabilities	526,441	503,430	480,113	456,499	652,166	633,664	615,017	596,243
Net worth	337,369	325,170	316,967	312,348	263,046	241,703	224,560	211,178
Net worth change	-18,712	-12,199	-8,203	-4,619	-49,302	-21,343	-17,144	-13,382
Net worth change (%)	-5 %	-4 %	-3 %	-1 %	-16 %	-8 %	-7 %	-6 %
Farm debt to asset ratio	87 %	89 %	89 %	90 %	100 %	103 %	106 %	109 %
Total debt to asset ratio	61 %	61 %	60 %	59 %	71 %	72 %	73 %	74 %
Other Information								
Personal income	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Family living expense	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Capital purchases	-	-	-	-	363,158	-	-	-
Capital sales	-	-	-	-	144,000	-	-	-

Financial Trends

	2026	***2027***
Source	Proj.	Proj.
Income Statement		
Gross cash farm income	166,108	166,108
= Gross farm income (accrual)	166,108	166,108
Total cash farm expense	127,224	127,136
+ Depreciation	28,899	25,977
+ Inventory change (expense items)	-	-
= Total farm expense (accrual)	156,123	153,113
Net farm income from operations	9,985	12,995
Gain or loss from capital sales	-	-
Net farm income	**9,985**	**12,995**
Profitability (market)		
Rate of return on assets	6.8 %	7.7 %
Rate of return on equity	n/a	n/a
Operating profit margin	21.7 %	23.5 %
Asset turnover rate	31.2 %	32.9 %
Liquidity & Repayment		
Current ratio (farm only)	0.08	0.08
Working capital (farm only)	-402,571	-389,418
Working capital to gross revenue	-242.4 %	-234.4 %
Term debt coverage ratio	0.40	0.39
Replacement margin coverage ratio	0.40	0.39
Efficiency Measures		
Operating expense ratio	60.9 %	60.9 %
Depreciation expense ratio	17.4 %	15.6 %
Interest expense ratio	15.7 %	15.7 %
Solvency (market, exclude def liab)		
Farm assets	518,521	492,544
Farm liabilities	577,359	558,387
Total assets	778,521	752,544
Total liabilities	577,359	558,387
Net worth	201,162	194,157
Net worth change	-10,015	-7,005
Net worth change (%)	-5 %	-3 %
Farm debt to asset ratio	111 %	113 %
Total debt to asset ratio	74 %	74 %
Other Information		
Personal income	40,000	40,000
Family living expense	60,000	60,000
Capital purchases	-	-
Capital sales	-	-

VITA

Joseph Brantley Stefenoni

Candidate for the Degree of

Master of Science

Thesis: AN EXPLORATION OF THE EFFECTS OF BEGINNING DEBT LEVELS AND LOW CROP COMMODITY PRICES ON THE POST FINANCIAL DOWNTURN FINACIAL PERFORMANCE OF REPRESENTATIVE CROP, LIVESTOCK, AND DIVERSIFIED FARMS IN OKLAHOMA

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- Self-employed auctioneer, Santa Rosa, CA – 2015 - present
- Graduate Teaching Assistant, Department of Agricultural Economics, Oklahoma State University, Stillwater, OK – 2016 - 2018
- Director of Membership and Leadership Development, The National Grange, Washington DC – 2015 - 2016
- Delivery Driver, Balletto Vineyards, Inc., Santa Rosa, CA – 2010 - 2012
- Owner & COO, Stefenoni Family Farming, Sebastopol, CA – 2002 - 2014