Probabilities of Success for Netherlands Dairy Farmers Moving Operations to the U.S.

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Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Denver, Colorado, July 1-4, 2004

Abstract

The probability of success for an immigrating Dutch dairy farmer was analyzed using a whole farm simulation model. Data used to simulate the U.S. farms came from the AFPC's database of representative U.S. dairies and projected mean annual prices from FAPRI. Data on the Dutch dairy used for analysis came from Department of Agriculture, Nature, and Food Safety, the Agricultural Economics Institute, and research from Wageningen University in the Netherlands. Results indicate that Dutch dairy farmers with adequate equity are better off financially immigrating to the U.S., rather than staying in the Netherlands.

INTRODUCTION

Milk is produced in all parts of the world. Over the past forty years, the number of dairy cows and dairy operations has decreased, while the average size of dairy farms has trended upward. In the U.S. dairy farming today is characterized by specialized, commercial milk production operations. Improved understanding of environmental, biological, and economic relationships has led to advances in technology and, therefore, to the increasing productivity of dairying. The dairy industry is also highly regulated, with government programs establishing support prices for milk.

The result is an industry where individual dairy farms respond to changes in exogenously determined variables through adjustments in level of productivity, mix of inputs, scale of operation, and geographical location, as well as determining whether or not to remain in the industry. This study will address the issue of geographical location, via economic incentives for migration of dairy farmers from the Netherlands to the United States.

Dairy producers in the Netherlands are struggling to stay in business due to increased environmental legislation, population density, intensity of farming systems, costs of production and quota restrictions. One option available to Netherlands dairy farmers is to sell their operation, put the money into an international bank such as RaboBank, and buy a dairy farm in the United States. However, RaboBank may not agree to lend the money for such a move/investment unless it is relatively certain of a high probability of success.

Objective

The primary objective of this research is to compare the economic viability of a representative Netherlands dairy farmer staying in the Netherlands versus moving to the United

States. The hypothesis to be tested is that a Dutch dairy farmer will have a greater probability of economic success by immigrating to the U.S. than staying in the Netherlands. Economic success is defined as the probability of earning a return greater than a 7 percent discount rate over a ten year planning horizon, i.e. having a positive net present value (NPV).

Procedure

Currently, there is no published history of NPV for dairy farms and it is unobservable for future time periods. One method for estimating NPV for a business is through simulation. A whole farm simulation model will be used to simulate a representative Dutch dairy and representative U.S. dairy farms in major production regions, over the 2004–2013 planning horizon, to estimate the NPV probability distribution for alternative farms. The model will simulate stochastic yields, prices, and production for 100 iterations (samples) to produce 100 different possible NPV's. From these values, an empirical probability density function (pdf) for NPV can be estimated for each farm.

The Agricultural & Food Policy Center (AFPC) at Texas A&M University maintains a database of 23 representative U.S. dairy farms in 10 states (Richardson, et al). The creation of a representative farm begins with a local extension specialist choosing a panel of farmers. The farmers are selected for their excellent management skills for being representative of average size farm in the region, and for being respected members of the local agricultural community. The panel of farmers is interviewed every 2 to 3 years to obtain data necessary to describe and simulate a farm representative of the panel members. All of the 23 representative farms could have all been used for comparison to a typical Dutch farm. However, only ten of the twenty-three farms will be used for analysis in this study, because the other thirteen would lead to an initial debt level greater than 53%, which would likely discourage a Dutch dairy farmer from investing in a particular United States dairy.

The ten representative U.S. farms to be compared are as follows: WA250, TXC500, TXE750, WI135, NYC110, VT134, VT350, MO85, MO400, and FLN500. The naming convention for the farms is: the state abbreviation is the first two letters followed by a number indicating the number of cows on the dairy. For example, WA250 represents a 250-cow dairy in Washington. See Figure 1 for an approximate location of the representative dairy farms.

Besten and Hoven (2004) described three representative Netherlands dairies from the major dairy producing regions in the Netherlands. The largest of the three farms was selected for analysis in this research; it has 122 milking cows and is located in the northern grassland area of Norordelijk, Holland. Historical data to define this farm were obtained from Department of Agriculture, Nature, and Food Safety, the Agricultural Economics Institute, and research from Wageningen University in the Netherlands.

REVIEW OF LITERATURE

The review of literature consists of three main areas: farm level simulation, dairy relocation, and ranking risky investments.

Farm Level Simulation

Whole-farm simulation models have been used extensively over the past forty years in the areas of financial planning, growth strategies, effects of farm programs, technological change, and investment under uncertainty. These models have traditionally been developed as single-use models focusing on one issue in one farm size or one location, unable to be applied to multiple scenarios analysis.

Halter and Dean (1965) developed the first whole-farm simulation model to evaluate price-forecasting methods for use by a large California cattle ranch with various buyer/seller management decisions. Based on the their results, it was concluded that simulation is a likely tool for risk analysis in the future, particularly if the decision maker's environment is characterized by uncertainty and the data are correlated over time.

Simulation for farm firm risk analysis was expanded on by Patrick and Eisgruber (1968), who created a simulation model that incorporated farm firm behavior in a dynamic environment with elements of risk and uncertainty. Their research concluded that a decision-maker's formulation of expectations regarding the future of a business, along with current financial position and economic goals, affects the selection of alternative farm plans (i.e., managerial ability and capital market structures).

Hutton and Hinman (1971) developed a farm level simulation model that included an added feature, accounting for differences in terms of farm type and geographic location. This added feature allowed analysis of farm economic activity and decision making of a broad range of commodity farms located throughout the United States. However, their model is no longer available.

Richardson and Nixon (1986) developed a generalized farm level simulation model capable of simulating dairy farms in multiple regions and countries. FLIPSIM uses projected mean prices, policy rules and regulations, producer input and macroeconomic data provided by the Food and Agricultural Policy Research Institute (FAPRI) to simulate stochastic economic outcomes for a representative farm. The model is recursive in that it simulates using the ending financial position for year one as the beginning position for the second year (Richardson and

Nixon 1986). FLIPSIM was chosen for the present study for its ability to stochastically simulate the annual economic activities of a farm in the U.S. and the Netherlands.

Dairy Relocation

Relocation has become a growing trend for dairy farmers over the past forty years. Once a producer decides to relocate, they are faced with decisions that not only affect the dairy, but also the family that owns and operates the dairy, and the employees. Moving a family and adjusting to a new area and possibly a different climate may be difficult for all involved (Monsanto, 1999).

Four main factors have led to relocation of dairies within the U.S. and around the world (i.e., from the European Union (E.U.) to the United States): proximity to milk markets, environmental regulations, location of cheap inputs (i.e. land, feed, water), and the changing dairy policy in Europe. All four factors trade places as to which one is most influential and important to decision makers.

Most dairy operations in the U.S. are located in the Northeast, Lake States, and Corn Belt regions, generally known as the traditional milk producing areas. In 2000, just over 71% of all U.S. dairy operations were located in these three areas (Blayney, 2002).

Due to low U.S. milk prices in the 1960's and early 70's, the government implemented an 80% parity support price for milk, which encouraged movement of dairies into non-traditional milk producing areas. Dairy farmers were able to sell high valued land in the traditional dairy producing regions and move to the Mountain and Southern Plains states, where land was cheap, readily available, and in close proximity to a milk market.

Between 1975 and 2000, the Southern Plains, Mountain, and Pacific regions experienced an increase in the share of the U.S. dairy herd from 18% to 37% (Blayney, 2002). Only the

Mountain and Pacific regions have shown relatively consistent large growth in cow numbers. Cow numbers in the Pacific region matched those in the Corn Belt in 1985, and then surpassed the Northeast in 1997 (Blayney, 2002).

In November 1998, the top twenty U.S. dairies (based on the number of milk producing cows) were ranked by Successful Farming magazine (Looker, 1998). The smallest of the farms had 6,500 cows and the largest had 18,500 cows. The average size of a U.S. dairy farm in 2000 was 88 cows (Blayney, 2002). U.S. dairy farms are expected to continue to grow, become more concentrated in certain regions, and become more specialized in producing milk (Outlaw, et. al, 1996). The trend toward fewer but larger farms is evident throughout the United States.

In addition to a change in where milk is produced, the U.S. dairy industry has also seen many structural changes in recent history. The number of U.S. dairy operations decreased from 160,640 in 1991 to 97,560 in 2001 (USDA, 2002), while milk production per cow has increased from 15,031 pounds per cow to 18,139 pounds per cow over the same time period.

One example of a structural change in the U.S. dairy industry is the adoption of Recombinant Bovine Somatotropin (rbST). Predicted rbST adoption rates from ex ante studies range from 8% to 41% for early adopters, and from 33% to 92% for eventual adopters (Lesser et al 1999; Zepeda 1990; Kinnucan et al 1990; Saha et al 1994). Adoption rates increase across all of the farm sizes, ranging from as low as 11% of operations with fewer than 50 cows and as high as 65% of operations with 1,000 or more cows (McBride, et al 2002). McBride, et al (2002) found that the use of rbST significantly increased milk production per cow, an average of 3,000 pounds, after statistically controlling for other factors that would affect milk production.

Another example of structural change in the U.S. dairy industry is in its feeding systems. U.S. dairy farms are becoming larger and more concentrated in certain regions, and are becoming more specialized in producing milk (Blayney 2002). As dairies become more specialized in milk production, they reduce the amount of crops grown on their own farms and purchase more feed from other sources.

United States vs. Netherlands Dairy Industries

The U.S. and Netherlands have seen similar trends over the last 10 to 15 years. The total number of milk cows in the U.S. has declined from 9.8 million in 1991 to 9.1 million in 2001 while the total number of milk cows in the Netherlands declined from 1.8 million to 1.4 million (Bailey 2002, USDA 2002). Average total milk production in the U.S. increased from 147.7 billion pounds in 1991 to 165.5 billion pounds in 2001, while total milk production in the Netherlands increased from 24.3 billion pounds to 24.7 billion pounds (UDSA, 2002).

Dairy production is one of the most important production sectors of Dutch agriculture. Since land and labor are expensive in the Netherlands, the production systems used in agriculture are highly intensive. The Dutch dairy sector has seen radical changes in focus over the last 40 years. The period between 1960 and 1980 was known for increased productivity and efficiency, while the period between 1980 and 2000 focused on environmental quality and supply controls (Horne and Prins 2002).

Two major developments in E.U. dairy policy have driven milk prices up for farmers and restricted farmers ability for growth, which has made it very attractive to relocate their operations. In the early 80's, E.U. dairy farmers were faced with more stringent environmental quality regulations aimed at reducing air and water pollution. Dutch dairy farmers have to satisfy the criteria for environmental licenses, entailing costs in the form of investments in waste storage and waste management (Horne and Prins 2002).

E.U. dairy policy requires a minimum of approximately 1.24 acres of pastureland per dairy cow (Besten and Hoven 2004), which costs about $13,900 per acre. If a Dutch dairy is operating at full capacity (i.e. the land requirement is met), and wishes to expand production by purchasing more cows, the dairy has to purchase or rent more land, about $17,160 per cow.

The second development in E.U. dairy policy was the introduction of a milk production quota system in 1983. A production quota was put in place to stop the surplus production realized during the 1960's and 1970's. Milk production quotas have had an enormous impact on the development of Netherlands dairy farming, changing the focus from expanding production to reducing costs of production (Horne and Prins 2002). Due to increased costs in the form of environmental regulations and production quotas, many dairy farmers stopped producing milk.

According to Besten and Hoven (2004), quota is held as an asset and the marginal cost per unit to purchase additional quota is $2.30 per pound. The representative Dutch dairy used for this analysis has 2.2 million pounds of milk quota, which is worth approximately $5.06 million, or about $41,500 per cow. This asset is required for the right to produce and sell milk in the European Union. Rate of return on investment (RORI) is calculated as net returns divided by the sum of assets minus debt. As the milk quota value increases, so too does the asset value, which drives down RORI. The increased price of land, the minimum land per cow requirement and the introduction of the quota system have limited the growth of the dairy industry in the Netherlands.

Ranking Risky Investments

In a stochastic analysis, risky alternatives our ranked based on the trade off between income and risk. To facilitate the ranking process, the number of variables used to summarize the economic performance of a business is generally reduced to one, namely NPV. NPV is used because it represents the present value of the net income flows generated by the business over the planning horizon, plus the real change in net worth over the planning horizon.

NPV probability distributions for alternative farms can be compared and ranked using a variety of procedures. In the past, stochastic dominance with respect to a function (SDRF) has been used for several simulation studies to rank risky scenarios for different levels of risk aversion (Kramer and Pope 1981, Lemieux et. al.1982). Stochastic dominance is a pairwise comparison of distributions for risky alternatives, which identifies the efficient set for risk averse decision makers (Hardaker et. al. 1997, Richardson 2004). The risky alternatives in the efficient set are ranked higher or are more preferred to those not in the efficient set.

The main advantage of using stochastic dominance is that it uses the entire empirical distribution as opposed to only the mean or the variance when ranking scenarios. The level of risk aversion for decision makers is specified by a risk aversion coefficient (RAC). Positive RAC values denote risk averse decision makers while negative RAC values denote risk loving decision makers (Hardaker et. al. 1997). The primary problem with generalized stochastic dominance is that it can result in inconsistent efficient sets for the lower and upper RAC values (Hardaker et. al. 1997). For example, if the cumulative distributions of NPV for two scenarios (A and B) cross then the rankings at the Lower RAC may differ from the rankings at the Upper RAC if a breakeven RAC lies between the Lower and Upper RACs (McCarl 1988).

Stochastic efficiency with respect to a function (SERF) is an alternative procedure for ranking risky scenarios (Hardaker, et al, 2004). The SERF method includes all the advantages of SDRF, yet is more transparent and easier to implement. SERF can identify a smaller number of alternatives in the efficient set over a given range of risk aversion and is potentially more discriminating than the pairwise SDRF technique. Additionally, it is capable of identifying RAC levels where decision makers' preferences will change from one alternative to another. SERF will be used in this research to rank the alternative dairy farms using the NPV distributions estimated by simulating the Dutch farm and 10 alternative representative farms in the United States.

Panel Farm Data

Characteristics of the ten representative U.S. dairies and the Dutch dairy are summarized in Table 1. The U.S. dairy farms described in the table represent typical and high-level management farms in their specific geographic area. For example, a typical working dairy located in Whatcom county Washington has 250 cows and 200 acres of cropland (50% owned, 50% leased). This farm has total assets of $1.86 million, divided into real estate $1.16 million (62.1%), machinery $172,000 (9.2%), and livestock $534,000 (28.7%).

The representative Dutch dairy in the northern grassland area of Norordelijk, Holland has a total of 122 cows and 126.6 acres of cropland (62% owned, 38% leased). Total assets of the farm are $3.29 million, consisting of real estate $1.67 million (51%), machinery $114,500 (3%), livestock worth $161,920 (5%), and milk quota $1.35 million (41%) [1].

If the Dutch farmer were to liquidate the value of this representative farm and move to the U.S., they could invest their total asset value minus the sum of debts (assumed to be 26%) and transactions costs, sales costs, loss in value from an auction sale, transportation and relocation costs, and exchange rate adjustments. In the end, the representative Dutch farmer could come to the U.S. with about $1.48 million to invest in a U.S. dairy farm. For this research, it is assumed the producer applies the total $1.48 million to the purchase of a U.S. dairy and finances the balance.

[1] While quota has a book/market value of $5.06 million, it has a liquidation value of $1.35 million

Debt structure for the purchased dairy is assumed to be consistent with asset values, i.e. if land is 50% of assets then 50% of debt is long-term. Thus the 10 U.S. dairies used for the analysis are typical of dairy farms in different locales/sizes in the U.S. but with a common capitalization and therefore different debt to asset ratios.

RESULTS

The results chapter is divided into two sections. The first section summarizes the FLIPSIM simulation results for each of the 10 U.S. dairy sites and the representative Dutch dairy and the second section is the ranking of the 10 U.S. dairy sites based on the NPV for each of the representative farms.

Simulation Results

The 11 dairy farms were simulated assuming that crop yields, milk produced/cow, feed/crop prices, livestock prices, and milk prices are stochastic and are distributed multivariate empirical (MVE). Parameters for the MVE distribution are estimated using information for the past 10 years. Projected mean annual prices for the U.S. dairies came from the January 2004 FAPRI Baseline. Projected mean annual milk production per cow and crop yields for the planning horizon are estimated using current production levels provided by the panels and regional/national technology trends in the FAPRI Baseline. Linear trend forecasts of annual average prices, yields, and milk per cow are used as the means for simulating these variables on the Dutch farm. Results of simulating the 11 dairy farms over the 2004-20013 planning horizon are summarized in Table 2. The key output variables (KOVs) from the simulation model are:

- Net cash farm income (NCFI) is total cash receipts minus total cash expenses and does not include depreciation.

- Probability of negative NCFI is found by analyzing the range of simulated values of NCFI in each year and looking for the number of times the value is equal to or less than zero.
- Ending cash reserves (ECR) is total cash balance at the end of each year.
- Probability of negative ECR is found by analyzing the range of simulated values of ECR in each year and looking for the number of times the value is equal to or less than zero.
- Net Present Value (NPV) is the sum of the present value of owner withdrawals plus the change in real net worth over the planning horizon.

Average NPV for the Dutch farm is -$655,000 over the planning horizon and the farm has a zero probability of a positive NPV or economic success (Table 2). The Dutch farm has a zero probability of a negative cash farm income in any year of the planning horizon. At the outset the farm has a zero probability of negative cash reserves. However, after 2009 the probability of negative cash reserves is greater than zero, increasing from 10.3% in 2010 to 80.48% in 2013.

In terms of probability of economic success (positive NPV), the NCY110 and TXE750 farms have a 100% chance of success. The FLN500 farm has a 97.4% chance and the MO400 farm has a 92.8% chance of success. The probability of a real rate of return (RRR) exceeding one is 92.0% for the TXE750 farm and 88.3% for the FLN500 farm. The NYC110 dairy has a zero probability of RRR exceeding one.

The U.S. farms with the highest average NPVs are the FLN500 ($1,126,450) and TXE750 ($1,325,480) (Table 2). These two farms have significantly more risk than the Dutch farm as evidenced by the coefficient of variation (CV) on NPV. The Florida farm has a CV on NPV of 36.6%, the Texas farm has a CV of 34.2%, while the Dutch farm has a CV of 3.1%. The higher CV on NPV for the U.S. farms is due to much greater risk on milk price, feed prices, and milk production per cow.

The probability of negative annual NCFI ranges from 4.5% to 26.7% on the FLN500 farm (Table 2). On the TXE750 dairy farm the probability of negative annual NCFI ranges from 9.4% to 25%. The NYC110 dairy has a zero probability of negative annual NCFI over the full period and the probability of negative NCFI is less than 4% each year on the VT134 dairy farm.

If a farm has adequate ECR, a negative NCFI may not require refinancing assets. When cash reserves plus NCFI are not adequate to cover cash outflows for principal payments, owner withdrawals, income taxes, and machinery replacement, the farm will experience negative ECRs and must refinance to remain in business. On the Dutch farm, the probability of negative annual ECR is zero through 2009. After 2009, the probability of having to refinance increases steadily from 10.3% to 80.48% in 2013.

The probability of negative ECR is quite low (less than 2%) on the NYC110 farm (Table 2). On the VT134 farm the probability of negative ECR is 3% to 18% over the period. In contrast the FLN500 farm has a 72% chance of negative ECR in 2004, but this value declines to 28% by 2013. A similar cash flow problem is observed for the probability of negative ECR on the TXE750 dairy where the probability reaches a low of 28% in 2013.

Ranking Farms

The SERF analysis requires specifying lower and upper RAC levels and selecting a utility function. A negative exponential utility function was assumed for the study. Based on the level of standard deviations for NPV across the 11 dairy farms and McCarl and Bessler's (1989) rule for setting RACs an upper RAC of 0.000015 was selected. A lower RAC of zero was assumed to reflect a decision maker who is risk neutral.

The NPV empirical probability distributions for the 11 dairy farms generated from the stochastic analyses were ranked using SERF. The chart in Figure 2 displays the results of the SERF rankings. All risk neutral and risk averse decision makers with RACs of 0 to 0.000015 would prefer the TXE750 dairy. The second choice would be the FLN500 dairy over the RAC range of 0 to 0.000010625. Decision makers with a RAC greater than 0.000010625 would prefer the NYC110 dairy over the FLN500 dairy. The MO400 dairy is in the top four for decision makers who have RAC levels less than 0.000015.

If the alternative dairies are ranked based on mean NPVs, the top four farms are ranked as: TXE750, FLN500, MO400, and NYC110. Ranking the farms on minimum standard deviation for NPV results in DF122, NYC110, MO85, and VT134 in the top four farms. Basing the rankings on the probability of negative ECR results in the NYC110 farm being first followed by the VT134 farm. Ranking the farms based on probability of success has NYC110 tied with TXE500, followed by FLN500 and then MO400.

SUMMARY AND CONCLUSION

Modern dairy farming is characterized by specialized, commercial milk production operations. Increased understanding of dairy related systems has led to advances in technology and therefore increased productivity. The dairy industry is also highly regulated, with government set milk prices and environmental policies. The end result is an industry where individual dairies respond to exogenously determined variables by adjusting the level of productivity, mix of inputs, size and scale of operation, geographic locations, as well as determining whether or not to stay in the industry.

The objective was to analyze the economic viability of a 122-cow dairy farm in the Netherlands continuing to operate or to immigrate to the U.S. and buy a dairy farm. Ten different dairy operations in the U.S. were analyzed in a stochastic simulation framework assuming the Dutch farm invested $1.48 million in each farm and financed the balance as long- and intermediate-term debt. The results of the stochastic simulations were used to estimate empirical probability distributions for NPV to calculate the probabilities that annual NCFI and ECR are negative.

Results of the analysis show that the Dutch farm has an average NPV of -$655,000 over the 2004–2013 period, while 5 of the 10 U.S. farms had positive average NPVs. The Dutch farm has a zero probability of economic success and a zero chance of having a real rate of return greater than one. Four U.S. dairy farms, FLN500, MO400, NY110, and TXE750 would give the Dutch farmer a 90% or greater chance of economic success and offer more than an 85% chance of real rate of return greater than one.

The SERF analysis of the 11 dairy farms indicates that for all decision makers with RAC levels over the range of 0 to 0.000015, the TXE750 dairy in preferred. The second ranked dairy is the FLN500 over the RAC interval of 0 to 0.000010625. For decision makers more risk averse than 0.000010625 the NYC110 dairy is their second choice. Eight of the 10 U.S. dairy farms are ranked higher by risk averse decision makers than the Dutch farm.

In conclusion, Dutch dairy farmers who have adequate equity would be much better off financially to immigrate to the U.S. if they want to continue dairying, rather than staying in the Netherlands.

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Figure 1. Location of U.S. Dairy Farms Selected for Analysis

Figure 2. Stochastic Efficiency with Respect to A Function (SERF) Ranking of Eleven Dairy Farms Assuming an Exponential Utility Function

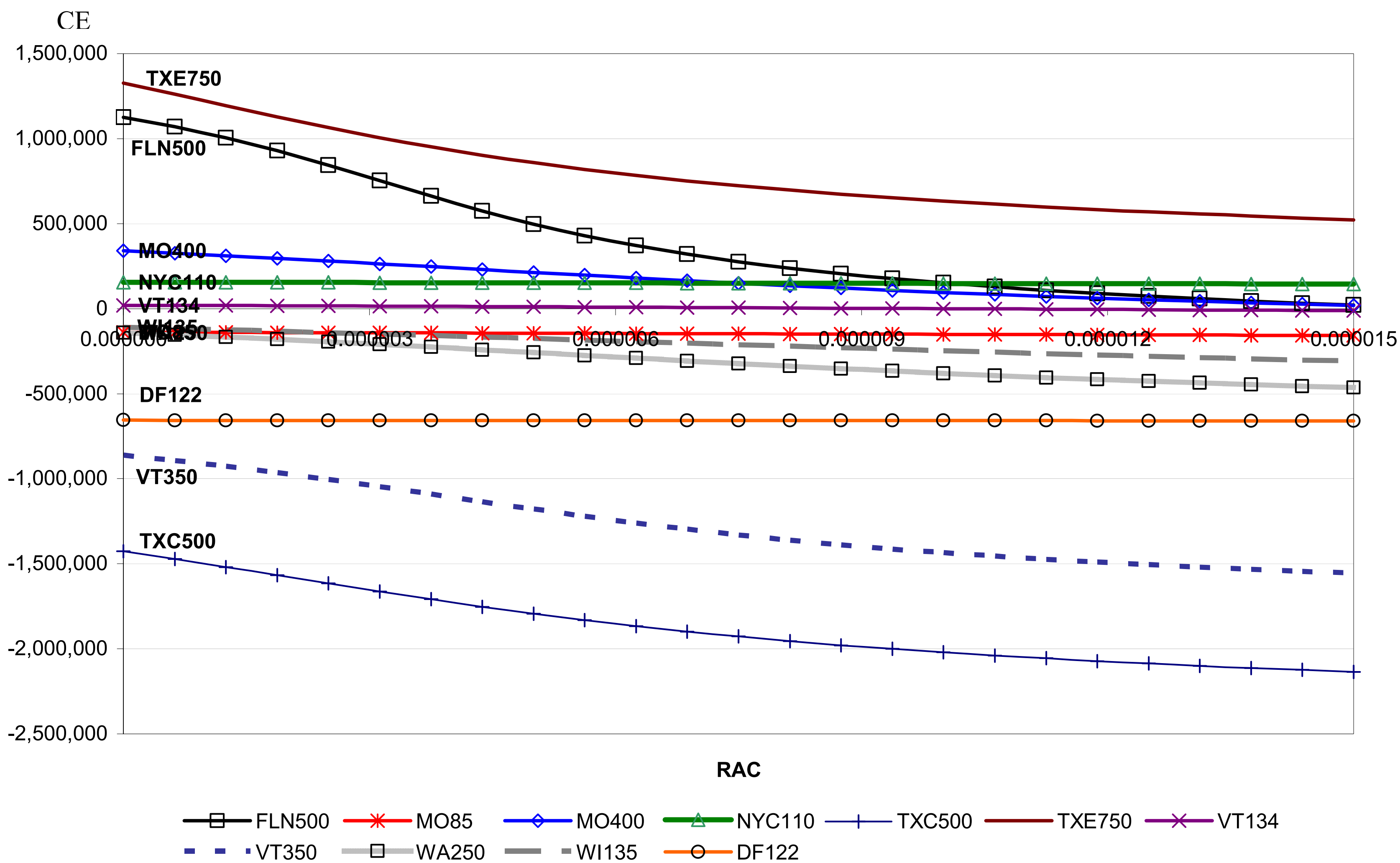

Table 1. Financial Characteristics of Ten U.S. Dairy Farms and a Representative Dutch Farm

	FLN500	MO85	MO400	NYC110	TXC500	TXE750	VT134	VT350	WA250	WI135	DF122
County	Lafayette	Christian	Dade	Cayuga	Erath	Hopkins	Washington	Washington	Whatcom	Winnebago	
Total Cropland	600.00	230.00	450.00	296.00	250.00	300.00	220.00	700.00	200.00	600.00	126.60
Acres Owned	450.00	230.00	450.00	250.00	250.00	150.00	100.00	525.00	100.00	330.00	78.09
Acres Leased	150.00	0.00	0.00	46.00	0.00	150.00	120.00	175.00	100.00	270.00	48.51
Pastureland											
Acres Owned	60.00	55.00	150.00	20.00	75.00	0.00	120.00	50.00	0.00	40.00	0.00
Acres Leased	0.00	55.00	0.00	0.00	0.00	0.00	0.00	50.00	0.00	0.00	0.00
Assets ($1,000)											
Total	2,879.00	923.00	2,379.00	890.00	2,027.00	1,525.00	950.00	2,920.00	1,863.00	2,136.00	3,292.55
Real Estate	1,397.00	575.00	1,256.00	355.00	977.00	530.00	374.00	1,868.00	1,157.00	1,462.00	1,670.59
Machinery	93.00	145.00	320.00	107.00	233.00	114.00	162.00	345.00	172.00	294.00	114.50
Quota	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,345.54
Other & Livestock	1,389.00	203.00	803.00	428.00	818.00	882.00	414.00	707.00	534.00	379.00	161.92
2003 Gross Receipts ($1,000)											
Total	1,839.90	240.40	1,107.30	435.20	1,331.10	1,290.90	455.70	1,228.20	837.40	487.80	319.52
Milk	1,713.50	188.70	1,002.70	367.80	1,198.00	1,140.70	379.50	1,125.90	761.60	410.80	286.07
Dairy Cattle	101.90	35.70	80.20	39.30	108.50	107.40	43.80	76.90	47.50	37.70	33.45
Hay	0.00	0.00	0.00	0.00	0.00	0.00	7.90	0.90	0.00	4.90	0.00
Corn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.70	0.00
Other Receipts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.80	0.00	0.00
2003 Planted Acres											
Total	130.00	230.00	600.00	275.00	500.00	350.00	220.00	700.00	200.00	600.00	126.60
Hay	130.00	200.00	315.00	80.00	500.00	50.00	26.20	40.00	0.00	297.00	0.00
Silage	0.00	30.00	135.00	131.00	0.00	0.00	193.80	660.00	200.00	0.00	126.60
Improved Pasture	0.00	0.00	150.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00
Corn	0.00	0.00	0.00	64.00	0.00	0.00	0.00	0.00	0.00	184.00	0.00
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.00	0.00

Table 2. Comparison of Economic Outlook for Ten U.S. Dairy Farms and a Representative Dutch Dairy Farm, 2004 - 2013*

	FLN500	MO85	MO400	NYC110	TXC500	TXE750	VT134	VT350	WA250	WI135	DF122
NPV (1,000)											
Mean	1,126.45	(138.50)	340.62	155.81	(1,426.42)	1,325.48	20.33	(859.68)	(140.64)	(108.52)	(655.85)
Std. Dev.	412.40	47.82	216.50	38.08	385.63	454.16	61.12	321.78	200.14	158.17	20.81
Prob(NPV>0)	97.43%	0.00%	92.87%	100.00%	0.00%	100.00%	66.42%	0.03%	25.17%	24.47%	0.00%
Prob(RRR>1)	88.36%	0.00%	35.87%	0.00%	0.00%	92.05%	0.00%	0.00%	0.86%	1.30%	0.00%
Prob(NCFI<0)											
2004	8.83%	0.00%	12.53%	0.00%	85.70%	18.40%	0.00%	84.55%	40.67%	35.04%	0.00%
2005	26.73%	10.91%	22.17%	0.00%	80.14%	25.01%	3.53%	81.43%	42.57%	45.58%	0.00%
2006	6.26%	2.43%	5.94%	0.00%	83.30%	15.93%	0.00%	79.33%	31.00%	33.50%	0.00%
2007	7.40%	2.23%	5.05%	0.00%	76.37%	8.22%	1.87%	81.01%	28.96%	46.19%	0.00%
2008	7.37%	4.90%	3.97%	0.00%	75.98%	9.52%	3.54%	73.43%	43.15%	45.98%	0.00%
2009	6.94%	13.76%	14.71%	0.00%	79.72%	6.11%	2.31%	76.71%	39.16%	48.03%	0.00%
2010	11.09%	18.16%	10.15%	0.00%	88.07%	13.09%	1.45%	72.64%	35.62%	64.36%	0.00%
2011	6.67%	13.31%	10.43%	0.00%	81.10%	12.13%	2.08%	74.74%	36.29%	75.73%	0.00%
2012	7.50%	5.36%	7.41%	0.00%	93.04%	9.42%	0.00%	85.08%	21.84%	72.95%	0.00%
2013	4.52%	7.11%	4.45%	0.00%	85.86%	9.40%	0.00%	77.79%	23.85%	64.07%	0.00%
Prob(ECR<0)											
2004	72.25%	12.03%	50.89%	0.00%	98.73%	63.98%	6.19%	100.00%	61.56%	72.99%	0.00%
2005	63.37%	26.91%	55.08%	0.00%	95.40%	67.60%	18.01%	100.00%	66.63%	71.90%	0.00%
2006	47.77%	5.56%	70.88%	0.00%	93.72%	58.55%	3.42%	100.00%	57.28%	77.03%	0.00%
2007	27.04%	11.86%	19.90%	0.00%	79.89%	24.26%	5.28%	83.44%	44.94%	61.93%	0.00%
2008	35.97%	22.11%	26.46%	1.22%	85.08%	17.67%	9.28%	79.44%	55.97%	63.70%	0.00%
2009	37.53%	34.99%	29.76%	0.00%	83.07%	25.59%	10.56%	83.77%	44.07%	67.35%	0.00%
2010	35.88%	33.34%	27.80%	1.87%	88.53%	23.68%	10.61%	80.89%	47.86%	83.02%	10.30%
2011	33.01%	29.35%	31.08%	1.36%	90.33%	26.07%	9.75%	84.37%	49.92%	77.86%	27.47%
2012	28.23%	26.51%	15.86%	0.00%	96.70%	29.35%	6.52%	90.76%	40.02%	84.50%	26.34%
2013	28.20%	34.96%	23.44%	0.00%	93.00%	28.18%	6.20%	85.15%	38.06%	76.31%	80.48%

* Debt levels on the U.S. dairy farms differ based on the assumption that the Dutch dairy farm has $1.48 million for a downpayment/investment.
** NPV is Net Present Value.
*** NCFI is net cash farm income which equals total cash receipts minus total cash expenses and does not include depreciation.
**** Probability of negative NCFI is found by analyzing the range of simulated values of NCFI in each year and looking for the number of times the value is equal to or less than zero.
***** ECR is ending cash reserves which eaquls total cash balance at the end of each year.
****** Probability of negative ECR is found by analyzing the range of simulated values of ECR in each year and looking for the number of times the value is equal to or less than zero.