February 1996 E.B. 96-04

DFBS
Expert System
For Analyzing
Dairy Farm Businesses

Users' Guide
for Version 6.0

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INTRODUCTION

An expert system is a computer program that analyzes a situation based on available facts and gives recommendations equivalent to an expert's advice. In the Dairy Farm Business Summary (DFBS) Expert System the available facts are DFBS data and the experts are farm management faculty in the Department of Agricultural, Resource, and Managerial Economics. New York dairy farmers and Cooperative Extension Agents and Specialists use the DFBS Expert System as a tool to assist in analyzing the financial and production performance of dairy farm businesses.

The DFBS Expert System Version 6.0 is to be used in conjunction with the Dairy Farm Business Summary generated by Micro DFBS Version 3.2.[1] The DFBS Expert System is a Lotus 1-2-3 spreadsheet developed by Darwin Snyder, former Research Associate in the Department of Agricultural, Resource, and Managerial Economics. The Lotus 1-2-3 electronic spreadsheet software package (Version 2.2 or later) or compatible software and the Micro DFBS computer program are required to run the DFBS Expert System.

GETTING STARTED

The input data used by the DFBS Expert System is generated by Micro DFBS Version 3.2. To make the data file, select "Calculate and Print" from the main menu of Micro DFBS and enter the farm number. You are then asked for the output device. Type "F" for File. Then type "V" for Convert. The file <farm no.>XP.PRN will be created and stored in the same disk drive and directory as your other 1995 DFBS data files. Repeat this process for all completed DFBS files. Quit the Micro DFBS program.

The files <farm no.>XP.PRN must be on a disk in your A: drive for the DFBS Expert System to work properly. Copy all .PRN files to a floppy disk. For example, if your DFBS data are stored on the hard disk in a c:\dfbs\dfbsdata directory, you would type the following to copy the files to a formatted floppy disk in drive A:

cd\dfbs\dfbsdata <enter>
copy *.prn a: <enter>

Copy the DFBS Expert System file to your hard disk. Copy the file XP6FOR95.WK1 to your Lotus 1-2-3 directory on your hard disk. For example, if you have the file XP6FOR95.WK1 on a floppy in drive A:, and the Lotus 1-2-3 program in a \123 directory type the following:

cd\123<enter>
copy a:XP6FOR95.WK1 <enter>

[1]Putnam, Linda D., Wayne A. Knoblauch, and Stuart F. Smith, Micro DFBS, A Guide to Processing Dairy Farm Business Summaries in County and Regional Extension Offices for Micro DFBS Version 3.2, E.B. 96-02, January 1996.

USING THE DFBS EXPERT SYSTEM

Start the Lotus 1-2-3 software package. Load the DFBS Expert System by typing /FR (or select "File" and "Retrieve" from the Lotus menus). Select the DFBS Expert System, XP6FOR95, from the list of filenames[2].

After the spreadsheet is loaded you will see the first instruction screen below. The example farm, Henry Holstein (farm number 46007), is displayed.

XP6FOR95.WK1	Revised:	February 7, 1996
	Enter date used:	February 7, 1996
Purpose:	EXPERT SYSTEM FOR ANALYZING DAIRY FARM BUSINESSES	
Developed by:	D.P. Snyder Updated by: L.D. Putnam, Cornell Univ.	
Year:	1995 with 1994 Data Comparisons	
Version:	6	

PROCEDURE:

Step 1. Enter the date this program is used in cell G2, above.

Step 2. Insert a disk with the converted DFBS files in the A: drive. Type ALT I to import data from previously converted DFBS file. Select the desired farm file with the cursor and type "ENTER".

Step 3. Enter the farmer's name, if desired------> Henry Holstein

Step 4. The file you have selected is for farm---> 46007

(Tab right one screen to continue)

Change the default file directory to the A: drive. Insert the disk with the <farm no.>XP.PRN files in the A: drive and type:

/fd a:<enter>

Proceed with Steps 1 through 4 as instructed on the screen. For Step 2, hold down the <ALT> key while typing the letter "i". Step 4 displays the farm number of the file you imported in Step 2. Press <tab> to move to the second instruction screen, shown below:

[2] If "MEM" is flashing at the bottom of the screen then there isn't enough memory available to load the worksheet. Type the Lotus command /WGDOUDQ (Worksheet, Global, Default, Other, Undo, Disable, Quit). This will disable the "Undo" feature which uses alot of memory. Then retrieve the worksheet again.

PROCEDURE (continued):

Step 5. Based on the number of cows and barn type, the "Type" number that best describes this farm is ---> 4

Type 1. Small Conventional Stall Farms (60 cows or less) (ALT A)
Type 2. Large Conventional Stall Farms (over 60 cows) (ALT B)
Type 3. Small Free Stall Farms (180 cows or less) (ALT C)
Type 4. Large Free Stall Farms (over 180 cows) (ALT D)

Step 6. You may want to copy Step 7 for reference; it cannot be seen while the program is running.

Step 7. Press ALT A, B, C, or D, depending on your farm "Type" number.
-The program will pause for you to check data for this farm.
-Use the up and down arrow keys to sight verify the data.
-Type "ENTER" when you are done checking the data.
-Press ALT P to print the report to a dot matrix printer,
OR Press ALT L to print to a laser printer.

Go back to Step 2 (press "HOME" key) to continue with the next farm.

End of procedure

Proceed with Steps 5 through 7. Step 5 displays the farm type based on the number of cows and barn type. You may skip Step 6 since Step 7 is shown above. Step 7 instructs you to type <ALT>A, <ALT>B, <ALT>C, or <ALT>D depending on the type of farm (hold down the <ALT> key while typing the letter). If you wish to check the data, use the cursor keys ↑ and ↓. Press <enter> to return to the instruction screen. Press <ALT>P or <ALT>L to print the report. Use <ALT>P for a dot matrix printer, or <ALT>L for a laser printer.

Repeat Steps 2 through 7 for all the farms.

It is not recommended that you save the spreadsheet for each farm as the file is quite large and will use up your hard disk space. If you need to reprint a DFBS Expert System for a farm, repeat Steps 2 through 7.

In some instances you may want to compare the farm to a different group "type" than what is indicated in cell R4. For example, if a freestall farm averaged 181 cows, you may want to print a DFBS Expert System that compared the farm data to the small freestall group of farms as well as the large freestall group. Do this by typing the appropriate number (1-4) in cell R4 and then press ALT A, B, C, or D. In this example type a "3" to compare to the small freestall group of farms and then press ALT C. DO NOT SAVE THIS WORKSHEET OR THE FORMULA IN CELL R4 WILL BE LOST. You need to reload the original worksheet at this point in order to continue with other farms.

A sample DFBS Expert System Analysis Report follows:

EXPERT SYSTEM FOR ANALYZING DAIRY FARM BUSINESSES
1995 DAIRY FARM BUSINESS SUMMARY

Small Free Stall Farms (180 cows or less)

Farm No. 46007 Henry Holstein February 1, 1996

COMPARISON OF YOUR FARM BUSINESS
with similar farms in 1993 and 1994

SELECTED FACTORS: (Factor for "Your farm" is from page 1 of DFBS output except as noted.)	95 farms in 1993	96 farms in 1994	Your farm 1995
SIZE OF BUSINESS			
Average number of cows	116	117	157
Average number of heifers	96	94	101
Milk sold, lbs.	2182035	2248212	3500000
Worker equivalent	3.41	3.36	5.00
Total tillable acres	378	368	450
RATES OF PRODUCTION			
Milk sold per cow, lbs.	18770	19173	22293
Hay dry matter per acre, tons	2.7	2.8	3.4
Corn silage per acre, tons	14	16	18.9
LABOR EFFICIENCY			
Cows per worker	34	35	31
Milk sold per worker, lbs.	639227	669602	700000
COST CONTROL			
Grain & concentrate expense as % milk sales	27%	28%	29
Dairy feed & crop expense per cwt. milk	$ 4.51	$ 4.72	$ 5.15
Machinery costs per cow (page 11 of DFBS)	$ 497	$ 491	$ 689
CAPITAL EFFICIENCY (average for year)			
Farm capital per cow	$ 6948	$ 7050	$ 6236
Machinery and equipment per cow	$ 1363	$ 1411	$ 1413
Asset turnover ratio	0.44	0.44	0.52
PROFITABILITY (rates of return, page 3 of DFBS)			
Net farm income without appreciation	$ 40576	$ 41444	$ 6100
Net farm income with appreciation	$ 51806	$ 52381	$ 24250
Labor & management income per operator/mgr	$ 6744	$ 6083	$ -15592
Return on equity capital without apprec.	0.3%	0.3%	-16.7
Return on all capital without appreciation	2.5%	2.5%	-2.9
COST OF PRODUCING MILK (page 10 of DFBS)			
Operating cost of producing milk per cwt.	$ 10.07	$ 10.40	$ 11.01
Purchased inputs cost of producing milk per cwt.	$ 11.31	$ 11.58	$ 12.26
Total cost of producing milk per cwt.	$ 14.31	$ 14.58	$ 14.90
Milk receipts per cwt.	$ 13.17	$ 13.43	$ 12.44

Note: Business analyses generated through the use of this expert system are dependent upon the accuracy of the individual farm data submitted. Analyses are provided to assist the manager in making decisions regarding future management actions to improve the business. Cornell University and Cornell Cooperative Extension do not assume responsibility for decisions made by farmers.

February 1, 1996 ANALYSIS REPORT Farm no. 46007 Page 2

COMPARISONS OF KEY FACTORS FOR YOUR FARM WITH TOP PERFORMERS AND GROUP AVERAGES FOR:
96 Small Free Stall Farms (180 cows or less)

Factors	1994 Top * performers	1994 Group average	1995 Your farm	Comparative evaluation
YIELDS:				
Milk per cow, pounds	22785	19173	22293	Excellent
Hay, tons DM per acre	4.6	2.8	3.4	Very Good
Corn silage, tons per acre	21.6	16.2	18.9	Very Good
LABOR EFFICIENCY:				
Cows per worker	51	35	31	Fair
Milk per worker, lbs.	1007387	669602	700000	Good
COST CONTROL:				
Feed & crop expenses/cwt	$4.03	$4.72	$5.15	Fair
Machinery cost per cow	$359	$491	$689	Poor
CAPITAL EFFICIENCY:				
Asset turnover ratio	0.58	0.44	0.52	Excellent
Machinery invested per cow	$886	$1,411	$1,413	Good
COST OF PRODUCING MILK:**				
Operating cost per cwt.	$8.07	$10.40	$ 11.01	Fair
Purchased inputs cost per cwt.	$9.37	$11.58	$ 12.26	Fair
Total cost per cwt.	$12.57	$14.58	$ 14.90	Poor
PROFITABILITY:				
Rate return on equity without appreciation	12.0%	0.3%	-16.7	Poor
Rate return on all capital without appreciation	9.2%	2.5%	-2.9	Poor
Labor & management income per operator	$75,398	6083	$ -15592	Poor

*The top performer average is calculated independently for each factor. It is the average of 20 percent of all farms with the highest yield, labor efficiency and profitability factors. It is the average of one half of all farms with the lowest cost control and capital efficiency factors, and 25 percent of all farms with the lowest cost of producing milk.

**The cost of producing milk used in this expert system is calculated as total farm costs minus all non-milk receipts. The basis for this procedure is the assumption that all non-milk receipts were produced at a cost equal to their sale value.

"Total cost of producing milk" includes the cost of all resources used in the production of milk. "Purchased inputs cost of producing milk" does not include the unpaid family labor or the value of operator labor and management, and equity capital. "Operating costs" also exclude depreciation.

The comments below compare your farm to averages for:
96 Small Free Stall Farms (180 cows or less)

(Also, see page 2 for comparison with top performers.)

YIELDS -
Cows: 22293 lbs. sold per cow which is Excellent

- Your herd average is a major strength. It ranks among the top 20% for similar farms. Increases may be possible with improvement of herd management practices. Be sure efforts to improve production cost less than added returns.

FACTORS THAT MAY AFFECT HERD AVERAGE:
Feed & crop expense/cwt.: $5.15 per cwt. which is Fair
- Your feed & crop expense per cwt is higher than the average of similar farms. Take steps to reduce feed expenses, crop input costs and increase crop yields while maintaining high milk production.

Crop yields - Hay: 3.4 tons DM per acre which is Very Good
- This is a good combination of high production per cow and high hay yields as long as costs are controlled for both. Maintain high quality hay crop for continued high production per cow.

Crop yields - Corn silage: 18.9 tons/acr which is Very Good
- This is a good combination of high production per cow and high corn silage yields as long as costs are controlled for both. Maintain high quality silage for continued high production per cow.

Hay: 3.4 tons DM per acre which is Very Good

- Your hay crop yield is well above average. Yield is not a weakness in your hay enterprise. Continue to evaluate management practices to further improve yields. Strive for optimum timeliness of harvest.

Corn silage: 18.9 tons per acre which is Very Good

- Your corn silage yield is well above average. Continue to evaluate management practices to further improve yields. Strive for optimum timeliness of harvest.

LABOR EFFICIENCY -

Cows per worker: 31 cows per worker which is Fair

- Your labor efficiency is below average for similar farms and needs to be improved. Unless you use substantial labor on non-dairy enterprises, the inefficiency may be caused by poor cow handling design, obsolete facilities/equipment, or ineffective labor management practices. Find ways to improve cow traffic patterns and worker motivation.

Milk sold per worker: 700000 #/worker which is Good

- Your milk sold per worker is about average for similar farms, with room for significant improvement. A low herd average or a non-dairy enterprise may help explain this factor.

COST CONTROL -

Feed & crop expenses/cwt milk: $5.15 per cwt. which is Fair

- These costs are high compared to similar farms. Unless you produce crops well beyond the needs of your herd, make a major effort to review the herd feeding and crop production programs. You seem to be spending much more than necessary to feed your cows - at least more than others on similar farms.

Machinery costs per cow: $689 per cow which is Poor

- These costs are high compared to similar farms. Unless you produce crops well beyond the needs of your herd, reduction of these costs should be possible. Make a special effort to examine your need for and use of major equipment items. The use of custom work can be an economical means to meet peak period needs. Idle equipment can be very expensive.

COST OF MILK PRODUCTION

Your total cost of producing milk is estimated to be $ 14.90 per cwt. Your average milk price is $12.44 , leaving a return over total costs of $ -2.46 .

- Your total cost of producing milk is above the average of that for other Dairy Farm Business Summary cooperators. You are receiving returns on your own resources less than the 5 percent charged for equity capital and the value you placed on operator labor and management. To obtain reasonable rates of return on your labor and management and become competitive with other producers, you need to take steps to lower your total cost of producing milk per cwt.

Your average milk price, $12.44 , compared to your purchased inputs cost of producing milk of $12.26 , leaves a margin of $ 0.18 for your operator-supplied resources and unpaid family labor.

- Your purchased inputs cost of producing milk is higher than the average for Dairy Farm Business Summary cooperators, but you are receiving a positive return for unpaid family labor and your labor, management and equity capital. To become more competitive for the future, you need to substantially lower your cost of producing milk.

Your operating cost of producing milk, not including depreciation, unpaid family labor, operator labor & management, and equity capital, was $ 11.01 . Your average milk price was $12.44 , leaving the return of $ 1.43 to cover depreciation, unpaid family labor, and operator-supplied resources.

- Your operating cost of producing milk is similar to or higher than the average for Dairy Farm Business Summary cooperators. You should be concerned about the level of these costs and make a concerted effort to lower them. You need to examine your cropping, feeding, breeding and herd health programs to find ways of increasing production and lowering your costs per cwt.

NET COSTS OF PRODUCING MILK PER HUNDREDWEIGHT Farm no 46007 Page 6
Comparisons for your farm with group averages for:
96 Small Free Stall Farms (180 cows or less)

Category	Group	1994 average	1995 Your farm	Deviation
Dairy grain and concentrate		$ 3.81	$ 3.57	
Total feed expense		3.89	4.15	$ 0.26
Crop expense		0.83	1.01	
- Crop sales and government receipts*	-	0.55	- 0.91	
Net Feed and Crop Expense		$ 4.17	$ 4.24	$ 0.07
Hired labor		1.41	1.39	
Operator's and family labor		1.77	2.07	
Total Labor Expense		$ 3.18	$ 3.46	$ 0.28
Machine repairs, fuel, and hire		1.43	1.81	
Machinery depreciation		0.76	0.97	
- Gas tax refunds and custom work	-	0.04	- 0.09	
Net Machinery Expense		$ 2.15	$ 2.69	$ 0.54
Replacement and expansion cattle purchased		0.46	0.01	
- Sales and inventory growth	-	1.45	- 0.64	
Net Cattle Purchases		$ -0.99	$ -0.63	$ 0.36
Milk marketing costs		0.75	0.24	
All other livestock exp. excluding purchases		1.29	1.00	
Net Livestock Expenses		$ 2.04	$ 1.24	$ -0.80
Real estate repairs, rent, and taxes		0.81	1.33	
Building depreciation		0.42	0.29	
Total Real Estate Expense		$ 1.23	$ 1.61	$ 0.38
Interest paid		0.83	1.09	
Interest on equity		1.23	0.57	
Total Interest Expense		$ 2.06	$ 1.66	$ -0.40
Other operating expenses		0.87	0.63	
- Miscellaneous income	-	0.13	- 0.00	
Net Miscellaneous Expenses		$ 0.74	$ 0.63	$ -0.11
Total Cost of Producing Milk		$ 14.58	$ 14.90	$ 0.32
Purchased Inputs Cost of Producing Milk**		$ 11.58	$ 12.26	$ 0.68
Total Operating Cost of Producing Milk		$ 10.40	$ 11.01	$ 0.61

* Non-crop related government payments may produce irregular results.
** Total cost excluding unpaid family labor and the opportunity costs of the operator's labor, management, and equity capital.

HOW THE DFBS EXPERT SYSTEM WORKS

Page 1 of the DFBS Expert System Analysis Report compares the individual farm data to a group average for the last two years. The group averages are from farms with similar size and barn types. The four groups of farms are:

a) small conventional stall farms with 60 or less cows and a stanchion barn;

b) large conventional stall farms with more than 60 cows and a stanchion barn;

c) small freestall farms with 180 or less cows and a freestall barn;

d) large freestall farms with more than 180 cows and a freestall barn.

Page 2 of the report compares selected factors from the individual farm with the group average. There is also a comparison to the group of farms (top performers) that ranked the highest for these factors. The "top performers" are based on data from all farms.

A comparative evaluation is done for each of the factors ranging from Poor to Excellent. The comparative evaluations are based on the individual farm data's rank by decile when compared to the decile averages of the group. For example, if the milk production per cow for a large freestall farm was 15,590 pounds, this factor would have a decile ranking of 10 (see Table 4). The factor is closest to the lowest average decile group for large freestall farms. This farm would then have a comparative evaluation of "poor" for the milk per cow factor, since rankings of 9 - 10 are defined as "poor" (see Table 5).

Tables 1 through 4 are the farm business charts for the four groups of farms that are used for comparison to determine a farm's rank. Table 5 shows the comparative evaluations based on the decile rank.

Table 1

1994 DFBS FARM BUSINESS CHART*
69 Small Conventional Stall Farms, 1994
(<=60 Cows)

	Yields			Labor Efficiency		Cost Control	
Decile	Pounds Milk Sold Per Cow	Tons Hay Crop DM/Acre	Tons Corn Silage Per Acre	Cows Per Worker	Pounds Milk Sold Per Worker	Feed & Crop Expenses Per Cwt.	Machinery Costs Per Cow
1	21,897	4.3	23	43	722,584	$3.17	$278
2	20,349	3.6	20	35	626,587	3.74	318
3	19,576	3.2	18	31	568,551	3.96	366
4	18,797	2.8	18	29	494,509	4.14	414
5	17,788	2.4	16	27	460,752	4.36	443
6	17,019	2.1	15	25	445,006	4.60	475
7	16,251	2.0	14	23	416,992	4.94	505
8	15,493	1.9	13	22	376,560	5.30	539
9	14,166	1.6	11	20	321,752	5.57	591
10	11,923	1.2	8	16	250,079	6.50	831

	Capital Efficiency		Cost of Producing Milk			Profitability		
						Rate Return without appreciation on:		
Decile	Asset Turnover Ratio	Machinery Investment Per Cow	Operating Cost Per Cwt.	Purch. Input Cost Per Cwt.	Total Cost Per Cwt.	Equity Capital	All Cap.	Labor & Mgt. Income Per Oper.
1	0.70	$666	$5.82	$7.41	$12.53	8.6%	7.4%	$25,239
2	0.51	881	7.67	9.11	13.97	3.3	4.2	14,750
3	0.45	1,041	8.60	10.02	14.47	0.7	2.2	10,716
4	0.40	1,159	9.14	10.39	14.89	-0.9	0.9	5,469
5	0.38	1,280	9.43	10.66	15.36	-2.4	0.1	1,841
6	0.36	1,442	9.84	11.14	15.86	-3.6	-0.4	-1,561
7	0.33	1,645	10.65	11.66	16.51	-4.9	-1.3	-4,656
8	0.29	1,828	11.13	12.16	17.33	-7.0	-2.6	-8,365
9	0.25	2,064	11.63	12.92	18.26	-12.9	-4.8	-18,289
10	0.18	3,302	13.63	15.47	23.01	-34.6	-12.0	-31,199

*Each column of the chart is independent of the others. The farms which are in the top 10 percent for one factor would not necessarily be the same farms which make up the top 10 percent for any other factor.

Table 2

1994 DFBS FARM BUSINESS CHART
71 Large Conventional Stall Farms, 1994
(>60 Cows)

	Yields			Labor Efficiency		Cost Control	
Decile	Pounds Milk Sold Per Cow	Tons Hay Crop DM/Acre	Tons Corn Silage Per Acre	Cows Per Worker	Pounds Milk Sold Per Worker	Feed & Crop Expenses Per Cwt.	Machinery Costs Per Cow
1	22,189	5.1	24	48	916,052	$2.89	$272
2	20,323	3.9	20	39	693,816	3.66	331
3	19,731	3.5	18	36	651,968	4.01	367
4	19,070	3.1	17	33	615,426	4.32	397
5	18,843	2.9	16	32	582,121	4.55	425
6	18,327	2.7	15	30	532,500	4.78	459
7	17,406	2.4	15	28	500,895	4.99	494
8	16,563	2.2	13	26	455,380	5.20	539
9	15,388	2.0	12	24	424,899	5.52	624
10	13,835	1.5	9	21	375,069	6.59	710

	Capital Efficiency		Cost of Producing Milk			Profitability		
						Rate Return without appreciation on:		
Decile	Asset Turnover Ratio	Machinery Investment Per Cow	Operating Cost Per Cwt.	Purch. Input Cost Per Cwt.	Total Cost Per Cwt.	Equity Capital	All Cap.	Labor & Mgt. Income Per Oper.
1	0.58	$674	$6.59	$7.69	$12.25	7.6%	7.4%	$28,947
2	0.52	879	8.57	9.77	13.35	4.9	5.6	20,229
3	0.48	1,027	8.99	10.45	13.79	3.7	4.5	16,010
4	0.46	1,097	9.61	10.86	14.19	2.3	3.4	12,516
5	0.43	1,228	10.09	11.32	14.64	0.8	2.7	7,265
6	0.40	1,339	10.55	11.66	15.00	-1.1	1.5	3,312
7	0.38	1,426	10.89	11.91	15.37	-2.6	-0.2	-3,056
8	0.35	1,683	11.22	12.23	15.92	-4.3	-1.2	-10,172
9	0.31	1,908	11.76	12.97	16.80	-8.4	-2.5	-16,348
10	0.27	2,287	13.36	14.50	18.03	-21.3	-6.5	-40,921

Table 3

1994 DFBS FARM BUSINESS CHART
96 Small Freestall Farms, 1994
(≤180 Cows)

	Yields			Labor Efficiency		Cost Control	
Decile	Pounds Milk Sold Per Cow	Tons Hay Crop DM/Acre	Tons Corn Silage Per Acre	Cows Per Worker	Pounds Milk Sold Per Worker	Feed & Crop Expenses Per Cwt.	Machinery Costs Per Cow
1	23,575	5.5	24	55	1,012,453	$3.25	$277
2	21,582	3.8	20	49	857,659	3.83	335
3	20,823	3.5	18	42	803,445	4.12	374
4	19,939	3.1	17	38	738,212	4.35	415
5	19,272	2.9	16	35	680,046	4.55	456
6	18,731	2.8	15	33	624,360	4.73	485
7	17,842	2.5	15	31	592,821	4.95	528
8	17,144	2.1	14	29	561,754	5.20	592
9	16,391	1.8	13	27	513,673	5.42	670
10	14,507	1.4	11	22	405,611	6.21	799

	Capital Efficiency		Cost of Producing Milk			Profitability		
						Rate Return without appreciation on:		Labor & Mgt. Income Per Oper.
Decile	Asset Turnover Ratio	Machinery Investment Per Cow	Operating Cost Per Cwt.	Purch. Input Cost Per Cwt.	Total Cost Per Cwt.	Equity Capital	All Cap.	
1	0.72	$647	$7.55	$8.76	$11.98	16.6%	10.5%	$51,358
2	0.57	836	8.72	9.98	12.70	7.2	7.2	30,690
3	0.52	989	9.29	10.49	13.30	4.8	5.6	22,390
4	0.48	1,166	9.69	10.75	13.69	2.7	4.1	16,320
5	0.45	1,255	9.86	11.12	14.10	1.3	3.1	9,432
6	0.42	1,359	10.21	11.41	14.58	-0.3	1.8	2,313
7	0.39	1,540	10.55	11.90	15.18	-1.8	0.8	-3,360
8	0.37	1,788	11.24	12.57	15.91	-4.2	-0.3	-11,679
9	0.34	2,128	11.94	13.22	16.77	-8.3	-2.6	-19,757
10	0.26	2,852	13.53	14.74	18.49	-19.8	-5.5	-55,063

Table 4

1994 DFBS FARM BUSINESS CHART
63 Large Freestall Farms, 1994
(>180 Cows)

	Yields			Labor Efficiency		Cost Control	
Decile	Pounds Milk Sold Per Cow	Tons Hay Crop DM/Acre	Tons Corn Silage Per Acre	Cows Per Worker	Pounds Milk Sold Per Worker	Feed & Crop Expenses Per Cwt.	Machinery Costs Per Cow
1	24,801	5.5	22	65	1,306,713	$3.84	$233
2	23,472	4.4	20	53	1,093,175	4.05	295
3	22,655	4.1	19	47	1,011,822	4.24	330
4	21,928	3.7	18	46	964,401	4.40	357
5	21,395	3.5	16	44	933,249	4.51	386
6	20,967	3.2	15	42	901,922	4.65	426
7	20,780	3.1	15	40	850,753	4.74	468
8	20,134	2.8	15	37	813,336	4.85	514
9	18,893	2.4	14	35	717,586	5.12	547
10	15,710	1.6	12	30	616,668	5.62	614

	Capital Efficiency		Cost of Producing Milk			Profitability		
						Rate Return without appreciation on:		Labor & Mgt. Income Per Oper.
Decile	Asset Turnover Ratio	Machinery Investment Per Cow	Operating Cost Per Cwt.	Purch. Input Cost Per Cwt.	Total Cost Per Cwt.	Equity Capital	All Cap.	
1	0.86	$462	$8.83	$10.13	$11.90	21.4%	12.9%	$289,802
2	0.71	575	9.72	10.89	12.25	14.2	10.4	99,946
3	0.64	636	10.00	11.23	12.51	10.6	8.8	68,360
4	0.61	727	10.33	11.37	12.91	7.1	7.3	44,867
5	0.60	815	10.66	11.52	13.38	5.0	5.8	28,779
6	0.57	915	10.84	11.76	13.84	3.9	4.9	19,135
7	0.53	1,007	11.10	12.23	14.02	2.6	3.9	13,143
8	0.50	1,117	11.58	12.60	14.30	1.1	3.4	4,724
9	0.47	1,377	11.96	12.91	14.62	-1.4	1.9	-8,715
10	0.39	1,880	12.82	13.76	15.69	-24.6	-2.0	-50,954

Table 5

DFBS EXPERT SYSTEM
Comparative Evaluation Definitions

Factor	Comparative Evaluation				
	Excellent	Very Good	Good	Fair	Poor
		------ Decile Rank ------			
YIELDS:					
Milk per cow	1-2	3-4	5-6	7-8	9-10
Hay, tons DM/acre	1-2	3-4	5-6	7-8	9-10
Corn silage, tons/acre	1-2	3-4	5-6	7-8	9-10
LABOR EFFICIENCY:					
Cows per worker	1-2	3-4	5-6	7-8	9-10
Milk per worker, lbs.	1-2	3-4	5-6	7-8	9-10
COST CONTROL:					
Feed & crop expense/cwt	1-2	3-4	5-6	7-8	9-10
Machinery cost per cow	1-2	3-4	5-6	7-8	9-10
CAPITAL EFFICIENCY:					
Asset turnover ratio	3-5	2, 6, 7	1 & 8	9	10
Mach. investment/cow	2-3	4-5	1 & 6	7-8	9-10
COST OF PRODUCING MILK:					
Operating costs	1-2	3-4	---	5-10*	5-10**
Purchased input costs	1*	1**, 2-5*	2-5**	6-10*	6-10**
Total costs	1*	1**, 2-5*	2-5**	6-10*	6-10**
PROFITABILITY:					
Rate return on all capital without appreciation	1-2	3-4	5-6	7-8	9-10
Rate return on equity without appreciation	1-2	3-4	5-6	7-8	9-10
Labor & management income/operator	1-2	3-4	5-6	7-8	9-10

*When this cost of producing milk is less than the milk price.
**When this cost of producing milk is greater than the milk price.

Pages 3 through 5 of the DFBS Expert System Analysis Report again list selected factors for the farm and the comparative evaluations. The comment printed on the report is based on the decile ranking of the factor. One comment may be used for more than one decile group. Also included are comments to the farm manager from an "expert" for each of the factors. The complete list of possible comments are listed below:

The comment menu: YIELDS

Cows: Milk sold per cow, lb.

Decile: 1,2 -

Your herd average is a major strength. It ranks among the top 20% for similar farms. Increases may be possible with improvements of herd management practices. Be sure efforts to improve production cost less than added returns.

Feed & crop expense per cwt-

Decile: 1-5 -
Your feed and crop expense per cwt is lower than the average of similar farms. This indicates excellent cost control and feed utilization considering your herd average.

Decile: 6-10 -
Your feed & crop expense per cwt is higher than the average of similar farms. Take steps to reduce feed expenses, crop input costs and increase crop yields while maintaining high milk production.

Crop yields - Hay:

Decile: 1-3 -
This is a good combination of high production per cow and high hay yields as long as costs are controlled for both. Maintain high quality hay crop for continued high production per cow.

Decile: 4-10 -
Continue to improve hay yield to reduce cost of feed and increase supply of quality hay crop to maintain or improve your excellent herd average.

Crop yields - Corn silage:

Decile: 1-3 -
This is a good combination of high production per cow and high corn silage yields as long as costs are controlled for both. Maintain high quality silage for continued high production per cow.

Decile: 4-10 -
Continue to improve corn silage yields to reduce feed costs and increase the supply of quality silage to maintain or improve your excellent herd average.

Decile: 3,4 -

Your herd average is above average for similar farms. Production gains are possible with further efforts to improve ration balance, conception rate, and feeding & milking practices.

Feed & crop expense per cwt-

Decile: 1-5 -
Feed & crop expense per cwt is lower than the average of similar farms. Strive to increase crop yields and improve quality to help improve production per cow.

Decile: 6-10 -
Feed & crop expense per cwt is higher than the average of similar farms. Take steps to reduce crop input costs and increase crop yields and quality.

Crop yields - Hay:

Decile: 1-3 -
Maintain excellent hay yield and quality to assure adequate supply of low cost nutrients to help improve production per cow.

Decile: 4-10 -
Improve hay crop yields and quality to control feed costs and increase production per cow.

Crop yields - Corn silage:

Decile: 1-3 -
Maintain excellent corn silage yield and quality to assure adequate supply of low cost nutrients to help improve production per cow.

Decile: 4-10 -
Improve corn silage yields and quality to control feed costs and increase production per cow.

Decile: 5,6 -
Herd average is about average for similar farms. You should benefit from efforts to improve your feeding, reproduction, herd health, and milking practices. It's important to increase your herd average. (Same choice of comments on Feed & crop exp/cow and crop yields as for herd average deciles 3 & 4 above.)

Decile: 7-10 -
Herd average is a major weak point in the business. Over 60% of herds on similar farms have higher averages. A major effort is needed to improve: feeding practices - check for ration imbalance; breeding practices - check days dry and conception rates; herd health and milking practices.

Feed & crop expense per cwt-

Decile: 1-5 -
Feed & crop expense per cwt is lower than the average of similar farms. Continue efforts to control crop input costs and improve forage quality by timely harvest.

Decile: 6-10 -
High feed & crop expense per cwt and low production per cow is a poor combination. Take steps to reduce crop input costs, improve forage quality, purchase high quality but economical feed, balance the total ration and follow recommended feeding practices.

Crop yields - Hay:

Decile: 1-3 -
Maintain excellent hay yield. Be sure hay quality is high and dairy ration is balanced and plentiful to support a major improvement in production per cow.

Decile: 4-10 -
Average or low hay yields indicate the herd may not be receiving enough high quality forage to support higher production. Higher yields will also help reduce feed costs.

Crop yields - Corn silage:

Decile: 1-3 -
Maintain your excellent corn silage yield. Be sure silage quality is high and dairy ration is balanced and plentiful to support a major improvement in production per cow.

Decile: 4-10 -
Average or low corn silage yields may indicate your herd may not be receiving enough high quality forage to support higher production. Higher yields will also help reduce feed costs.

Hay DM produced per acre, tn.

Decile: 1-3 -
Your hay crop yield is well above average. Yield is not a weakness in your hay enterprise. Continue to evaluate management practices to further improve yields. Strive for optimum timeliness of harvest.

Decile: 4-10 -
Unless soil type is a limiting factor or you experienced adverse weather, you should be able to improve yields. Maintain proper pH for the crop grown, test soil before seeding or at least every three years & fertilize per Cornell recommendations. Improve stand establishment & management.

Corn silage produced per acre, tn.

Decile: 1-3 -
Your corn silage yield is well above average. Continue to evaluate management practices to further improve yields. Strive for optimum timeliness of harvest.

Decile: 4-10 -
Unless soil type is a limiting factor or you experienced diverse weather, you should be able to improve yields. Improve weed control, plant population, timeliness of cutting and variety selection. Test soil and follow Cornell recommendations.

The comment menu: LABOR EFFICIENCY

Cows per worker, no.

Decile: 1-2 -

If you raise all your replacements and roughage, cows per worker is well above average for similar farms. This factor is affected by labor requirements for enterprises other than cows, cow handling design and equipment, and labor management practices. Be sure capital efficiency factors are reasonable.

Decile: 3-4 -

If you raise all your replacements and roughage, cows per worker is above average for similar farms. This factor is affected by labor requirements for enterprises other than cows, cow handling design and equipment,, and labor management practices. Be sure capital efficiency factors are reasonable.

Decile: 5-6 -

Your labor efficiency is about average for similar farms. This factor is affected by labor requirements for enterprises other than cows, cow handling design and equipment, and labor management practices. Be sure capital efficiency factors are reasonable.

Decile: 7-10 -

Your labor efficiency is below average for similar farms and needs to be improved. Unless you use substantial labor on non-dairy enterprises, the inefficiency may be caused by poor cow handling design, obsolete facilities/equipment, or ineffective labor management practices. Find ways to improve cow traffic patterns and worker motivation.

Milk sold per worker, lb.

Decile: 1-2 -

Your milk sold per worker is excellent compared to similar farms. This factor is affected by herd average as well as factors that affect cows per worker.

Decile: 3-4 -

Your milk sold per worker is above average compared to similar farms. This factor is affected by herd average as well as factors that affect cows per worker.

Decile: 5-6 -

Your milk sold per worker is about average for similar farms, with room for significant improvement. A low herd average or a non-dairy enterprise may help explain this factor.

Decile: 7-10 -

This factor is significantly below average for similar farms. See comments under YIELDS for milk production per cow. See also comments under LABOR EFFICIENCY for cows per worker. Improving these factors will increase milk sold per worker.

The comment menu: COST CONTROL

Feed & crop expenses/cwt milk

Decile: 1-4 -

These costs are low compared to similar farms. Continue to refine ration balancing and crop production practices to maintain control of these costs.

Decile: 5-6 -

This factor is about average for similar farms. Be sure to properly balance the nutrition requirements of the herd and re-examine crop production practices.

Decile: 7-10 -

These costs are high compared to similar farms. Unless you produce crops well beyond the needs of your herd, make a major effort to review the herd feeding and crop production programs. You seem to be spending much more than necessary to feed your cows - at least more than others on similar farms.

Machinery costs per cow

Decile: 1-4 -

These costs are low compared to similar farms. Continue to monitor and strive for effective and economical use of equipment to help labor do its job.

Decile: 5-6 -

This factor is about average for similar farms. Pay special attention to labor management practices and equipment use to encourage efficient use of both.

Decile: 7-10 -

These costs are high compared to similar farms. Unless you produce crops well beyond the needs of your herd, reduction of these costs should be possible. Make a special effort to examine your need for and use of major equipment items. The use of custom work can be an economical means to meet peak period needs. Idle equipment can be very expensive.

The comment menu: COST OF PRODUCING MILK

Total cost of producing milk

Decile: 1 & <milk price -

Your cost of milk production per cwt. is well below average and below your average milk price. Keep up the good work, and continue to strive for lower costs to keep competitive.

Decile: 1 & >milk price -

Your total cost of producing milk is in the lowest 10 percent of Dairy Farm Business Summary cooperators. However, it is above your average milk price. In the longer run, you need to find a way to lower your total cost of producing milk.

Decile: 2-5 & <milk price -

Total cost of milk production per cwt. is near or below average and below your average milk price. This is good performance but 20 percent of the Dairy Farm Business Summary cooperators have production costs lower than yours. To remain competitive in the long run, you should seek ways to lower your cost/cwt.

Decile: 2-5 & >milk price -

Your total cost of milk production is near or below the average of that for other Dairy Farm Business Summary cooperators. However, your total cost of producing milk is higher than your average milk price. This means that you are not covering your total costs, which include a 5 percent charge for your equity capital and the amount you stated as the value of operator labor and management. To obtain reasonable return for your own resources, you should try to lower your total cost per cwt. of milk produced.

Decile: 6-10 -

Your total cost of producing milk is above the average of that for other Dairy Farm business Summary cooperators. You are receiving returns on your own resources less than the 5 percent charged for equity capital and the value you placed on operator labor and management. To obtain reasonable rates of return on your labor and management and becomes competitive with other producers, you need to take steps to lower your total cost of producing milk per cwt.

Purchased inputs cost of producing milk

Decile: 1 & <milk price -

Your purchased inputs cost of producing milk is well below average. It is also well below your average milk price, leaving a substantial return to unpaid family labor and operator-supplied resources. Keep up the good work.

Decile: 2-5 & <milk price -

Your purchased inputs cost of producing milk is near or below the average for other Dairy Farm Business Summary cooperators. It is also below your average milk price, leaving a return for unpaid family labor and operator labor, management and equity capital. To keep up with your competition and increase the return to these resources, you should strive to lower your cost of producing milk.

Decile: 1-5 & >milk price -

Your purchased inputs cost of producing milk is near or below the average for other Dairy Farm Business Summary cooperators. However, it is above the average price you received for milk. This means that there was less than nothing left for your unpaid family labor and operator labor, management and capital. You need to lower your cost per cwt. in order to provide a positive return for the use of these resources.

Decile: 6-10 & <milk price -

Your purchased inputs cost of producing milk is higher than the average for Dairy Farm Business Summary cooperators, but you are receiving a positive return for unpaid family labor and your labor, management and equity capital. To become more competitive for the future, you need to substantially lower your cost of producing milk.

Decile: 6-10 & >milk price -

Your purchased inputs cost of producing milk is higher than the average for Dairy Farm Business Summary cooperators, and there was nothing left for unpaid family labor and your operator labor, management and capital. You need to lower your cost per cwt. in order to provide a positive return for the use of these resources and to become competitive with other milk producers.

Operating cost of producing milk

Decile: 1,2 -

Your operating cost of producing milk is well below the average for other Dairy Farm Business Summary cooperators. Keep up the good work, but check to see that non-operating costs are not excessive.

Decile: 3,4 -

Your operating cost of producing milk is well below the average for other Dairy Farm Business Summary cooperators. Keep up the good work, but check to see that non-operating costs are not excessive. Attempt to continue to strive to reduce operating costs.

Decile: 5-10 & <milk price -

Your operating cost of producing milk is similar to or higher than the average for Dairy Farm Business Summary cooperators. You should be concerned about the level of these costs and make a concerted effort to lower them. You need to examine your cropping, feeding, breeding and herd health programs to find ways of increasing production and lower your costs per cwt.

Decile: 5-10 & >milk price -

Your operating cost of producing milk is similar to or higher than the average for Dairy Farm Business Summary cooperators. Your operating costs per cwt. are higher than your average milk price, leaving nothing to cover depreciation, unpaid family labor, operator labor and management, and equity capital. You should be concerned about the level of these costs, and make a concerted effort to lower them. Examine your cropping, feeding, breeding and herd health programs to find ways of increasing production and lowering your costs per cwt.

The sixth and final page of the DFBS System Analysis Report is a comparison of net costs of producing milk per hundredweight. Net costs of producing milk are compiled using the whole-farm method which sets the costs of producing all nonmilk farm receipts equal to their value. For example, net feed and crop expenses are determined by deducting accrual crop receipts including changes in crop inventories and government program receipts from total feed and crop expenses. Net cattle purchases are determined by subtracting accrual cattle receipts which include changes in cattle inventories, from the cost of replacement and expansion cattle purchased. When cattle sales and inventory growth exceed the cost of purchased cattle, net cattle purchases will be negative. A negative net cost is the same as a positive net return.

Individual or "Your farm" data are compared to the average of the most similar group of farms (see Table 6) and a deviation from the group average is calculated. A positive deviation is the amount "Your farm" exceeds the group average cost per hundredweight of milk sold. A negative deviation is the amount "Your farm" is below the group average cost of production. This analysis enables the farm manager to pinpoint areas where costs may be reduced.

Table 6

NET COSTS OF PRODUCING MILK PER HUNDREWEIGHT
Average Data for Four Comparison Groups, 1994

Category	Group Averages for 1994			
	69 Small Conv.	71 Large Conv.	96 Small Freestall	63 Large Freestall
Dairy grain and concentrate	$3.74	$3.78	$3.81	$3.75
Total feed expense	3.92	3.87	3.89	3.86
Crop expense	0.72	0.82	0.83	0.65
-Crop sales & government receipts	0.60	0.67	0.55	0.37
Net Feed & Crop Expenses	$4.04	$4.02	$4.17	$4.14
Hired labor	0.78	1.28	1.41	2.22
Operator's & family labor	3.28	2.13	1.77	0.68
Total Labor Expenses	$4.06	$3.41	$3.18	$2.90
Machine repairs, fuel, & hire	1.43	1.40	1.43	1.10
Machinery depreciation	0.85	0.78	0.76	0.56
-Refunds & custom work	0.05	0.02	0.04	0.02
Net Machinery Expenses	$2.23	$2.16	$2.15	$1.64
Replacement & expansion cattle purchases	0.23	0.25	0.46	0.55
-Sales & inventory growth	1.34	1.09	1.45	1.40
Net Cattle Purchases	$-1.11	$-0.84	$-0.99	$-0.85
Milk marketing costs	0.84	0.82	0.75	0.59
All other livestock expenses excluding purchases	1.37	1.27	1.29	1.55
Net Livestock Expenses	$2.21	$2.09	$2.04	$2.14
Real estate repairs, rent, & taxes	0.89	0.85	0.81	0.62
Building depreciation	0.42	0.36	0.42	0.51
Total Real Estate Expenses	$1.31	$1.21	$1.23	$1.13
Interest paid	0.79	0.75	0.83	0.82
Interest on equity	1.65	1.37	1.23	0.76
Total Interest Expenses	$2.44	$2.12	$2.06	$1.58
Other operating expenses	0.94	0.85	0.87	0.63
-Miscellaneous income	0.14	0.11	0.13	0.13
Net Miscellaneous Expenses	$0.80	$0.74	$0.74	$0.50
Total Cost of Producing Milk	$15.99	$14.91	$14.58	$13.19
Purchased Input Cost of Producing Milk	$11.06	$11.40	$11.58	$11.75
Total Operating Costs of Producing Milk	$ 9.79	$10.26	$10.40	$10.67

OTHER A.R.M.E. EXTENSION BULLETINS

No. 95-19	Dairy Farm Business Summary Eastern New York Renter Summary 1994	Stuart F. Smith Linda D. Putnam
No. 95-20	Seneca County's Local Governments: Opportunities for Intergovernmental Cooperation, Needs for Educational and Technical Assistance	David Kay Duane Wilcox
No. 95-21	Farm Income Tax Management and Reporting Reference Manual	Stuart F. Smith Charles H. Cuykendall
No. 95-22	Income Tax Implications for Farmers Receiving New York City Watershed Agricultural Program Payments	John M. Thurgood
No. 95-23	New York Economic Handbook 1996 Agricultural Situation and Outlook	A.R.M.E. Staff
No. 95-24	Bee Economics A Computer Model for Economic Analysis of Beekeeping Operations	Lois Schertz Willett Nicholas W. Calderone Malcome T. Sanford
No. 96-01	Fruit Farm Business Summary Lake Ontario Region New York 1994	Gerald B. White Alison M. DeMarree Linda D. Putnam
No. 96-02	Micro DFBS A Guide to Processing Dairy Farm Business Summaries in County and Regional Extension Offices for Micro DFBS Version 3.2	Linda D. Putnam Wayne A. Knoblauch Stuart F. Smith
No. 96-03	The Return of Agricultural Lands to Forest Changing Land Use in the Twentieth Century	Bernard F. Stanton Nelson L. Bills