



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Dairy Replacement Programs: Costs & Analysis 3rd Quarter 2012



Jason Karszes

PRO-DAIRY
Department of Animal Science

Charles H. Dyson School of Applied Economics and Management
College of Agriculture and Life Sciences
Cornell University
Ithaca, New York 14853-7801

It is the Policy of Cornell University actively to support equality of educational and employment opportunity. No person shall be denied admission to any educational program or activity or be denied employment on the basis of any legally prohibited discrimination involving, but not limited to, such factors as race, color, creed, religion, national or ethnic origin, sex, age or handicap. The University is committed to the maintenance of affirmative action programs which will assure the continuation of such equality of opportunity.

Dairy Replacement Programs: Costs & Analysis 3rd Quarter 2012

Jason Karszes¹
Senior Extension Associate, PRO-DAIRY
Department of Animal Science
College of Agricultural and Life Sciences
Cornell University

As the dairy industry becomes more competitive and farms increase in size, economics of the dairy replacement enterprise has become an integral component of farm profitability, and a focus of strategic decisions within the business. The dairy replacement enterprise offers opportunities for decreasing costs, improving efficiencies, and maximizing the quality of animal entering the dairy herd. The purpose of this project is to identify the costs associated with raising heifers and to highlight the critical expense areas associated with raising dairy replacements.

STUDY METHODOLOGY

When analyzing dairy replacement programs on dairy farms, it has been difficult to generate accurate values of costs associated with raising dairy replacements as few farms keep records detailed enough to separate expenses between the various enterprises over multiple years.

To estimate the costs to raise dairy replacements, surveys were utilized by 18² participating farms to collect information concerning the inputs and investments utilized within their replacement program. This data set is not designed to represent the average raising costs for dairy replacements in New York. The data set represents a descriptive study of what costs are for the participating farms. Out of the 18 farms that completed the study for all animals being raised, 17 farms raised the majority of their heifers on-farm. Data from these 17 farms are summarized for this study.

¹ The author would like to thank John Hanchar, Extension Associate, NWN Dairy, Livestock and Field Crops Program, Cornell Cooperative Extension for his comments, edits, and improvements to this project.

² Data was compiled by: Jason Karszes & John Conway, Senior Extension Associates, PRO-DAIRY, Cornell University; John Hanchar, Extension Associate, NWN Dairy, Livestock, and Field Crops Program, Cornell Cooperative Extension; Fran Vokey, Dairy Health & Management Services LLC., Lowville, New York; Kerri S. Bartlett, Dairy and Livestock Educator, Cornell Cooperative Extension of Steuben County.

To complete the survey, farms used a combination of approaches. They tracked inputs and costs over a short period of time, analyzed their records over the last year and longer if needed and estimated input use to determine inputs and capital investment that were utilized by the replacement enterprise. This information was collected by group of replacements on the farm, as determined by the participating farm. A group was primarily determined by when rations being fed changed, and secondly by when animals switched facilities. With all the input data collected per group of animals, the average daily raising cost per group was determined. Combining the average daily cost per heifer per group with the number of days in each group determines the total raising costs per animal completing each group. The totals for each group are then summed to determine the total raising costs per heifer completing the replacement program.

With this approach, the key assumption is that the price for inputs being utilized during the study period would remain the same for the 22 to 25 months that the animal is in the replacement program. With the increasing variability of input prices, this has not been the case. Costs incurred for a replacement that entered the dairy herd of one of the study farms in December of 2012 would not be expected to equal the current costs as determined by the survey. The input costs for feed, fuel, and bedding have changed almost monthly over the last two years as the animal progressed through the replacement program. However, if the input prices remained consistent over the two years, animal's completing the replacement program would have these costs.

The focus of the study was to determine the costs for the individual farm participating, utilizing their actual input costs. With this focus in mind, only a few variables were standardized across all farms. The following assumptions were utilized across all participating farms.

- Value of calf entering program \$150
- Opportunity cost 7%
- Value of whole milk fed to calves, per cwt. \$17.00

TOTAL INVESTMENT IN RAISING THE ANIMAL

Table 1 is a summary of the total costs associated with raising dairy replacements for 17 farms in New York that participated in the cost study during the third quarter of 2012. While this study doesn't represent the average costs associated with raising dairy replacements in New York and only represents what occurred on these 17 farms, the data can be used to evaluate the costs associated with dairy replacements. These farms are above average in herd size and were considered to have higher quality dairy replacement programs. The average calving age for the farms on the study was 23.0 months.

The average total investment that these farm operators had in the animal at first calving was \$2,232. This represents all the costs that were assigned to the dairy replacement, the initial value assigned to the calf when she entered the system and charges for interest on investment and non-performance. Raising costs averaged \$2,084 per animal, with the

initial value of the animal for all farms assumed to be \$150. This value represents an estimate of the cost to get a heifer calf born alive, not the value for which the animal could be sold as a new born. The inter-quartile range for the raising costs for these 17 farms ranged from \$1,860 to \$2,263. The inter-quartile range represents a middle range of values reported and does not include the high and low extremes.

The largest expense was feed costs, representing 53.3% of the raising costs. Labor was the second largest expense, representing 12.1% of the raising costs. Interest on investment is the next largest expense at 6.9% of the total, followed by bedding costs and building ownership costs, both at 4.4%. All costs are defined and explained at the end of the paper. Two additional approaches to evaluate the costs associated with raising dairy replacements are to use cost per day per heifer and cost per pound of gain. Table 2 summarizes the costs per day per animal. Table 3 summarizes the costs on a per pound of gain basis.

COST PER DAY PER ANIMAL

Average raising cost per day per heifer was \$2.995 (Table 2). This cost does not include the initial value of the calf. Half of the farms were within the \$2.66 to \$3.40 range for costs per day per heifer. Feed cost was \$1.597 per day and labor cost was \$ 0.359 a day. All remaining costs equaled \$1.039 per day per heifer.

While the average cost per day per animal was \$2.995, there was a wide difference in cost per day based on the age of the animal. Changes in feed intake, changes in feed type, labor requirements as the heifer grows, changes group size, , and changes in housing systems all impact this difference. The average cost per day per animal averaged almost \$6.50 during milk feeding, \$2.00 to \$2.20 from weaning to breeding and \$2.60 to \$2.70 from breeding to close up to calving and back over \$3.50 right before calving. (Figure 1) Switching from fluid based feed to a dry feed and from hutches to loose housing, which decreased labor requirements, were the primary reasons costs dropped over \$4.00 per day per heifer when the animal was weaned. The increase in feed intake around puberty/breeding and the increase feed required to support a growing calf led to the increase in daily cost per day as the heifer approached calving.

Table 1

TOTAL COSTS TO RAISE HEIFERS 17 New York Dairy Farms, 3 rd Quarter 2012				
Total Cost per Animal Completing	Average	Percent of Total	Inter-Quartile Range	
Feed Total	\$1,112	53.3%	\$923	\$1,464
Grown Feed	\$701		\$494	\$938
Purchased Feed	\$411		\$242	\$653
Labor	\$252	12.1%	\$143	\$370
Bedding	\$90	4.3%	\$21	\$191
Health	\$42	2.0%	\$20	\$87
Breeding	\$48	2.3%	\$26	\$75
Trucking	\$3	0.1%	\$0	\$11
Insurance	\$2	0.1%	\$0	\$4
Machinery Operation	\$53	2.5%	\$24	\$105
Machinery Ownership	\$32	1.5%	\$16	\$51
Building Operation	\$28	1.4%	\$12	\$49
Building Ownership	\$90	4.3%	\$39	\$163
Manure Storage Operation	\$1	0.0%	\$0	\$5
Manure Storage Ownership	\$6	0.3%	\$0	\$20
Manure Spreading	\$44	2.1%	\$18	\$80
Custom Boarding	\$60	2.9%	\$0	\$286
Professional Services and Fees	\$1	0.0%	\$0	\$4
Non-Performance Expenses	\$80	3.8%	\$23	\$127
Interest on Daily Investment	\$143	6.9%	\$125	\$165
Total	\$2,084		\$1,860	\$2,263
Number of Heifers	636		333	1,305
Age, Months	23.0		20.3	25.0
Calving Weight, Pounds	1,302		1,208	1,368
Average Daily Gain	1.75		1.58	1.96
All Heifers per Labor Hour	39.4		26.4	57.6
Pre-Weaned Heifers per Labor Hour	11.6		6.2	21.7
Post Weaned Heifers per Labor Hour	59.0		38.8	102.1
Total Investment in Animal	\$2,232		\$2,010	\$2,413
% Non-Completion Rate	10.6		4.2	17.7
Cost per Worker	\$39,964		\$27,655	\$48,845

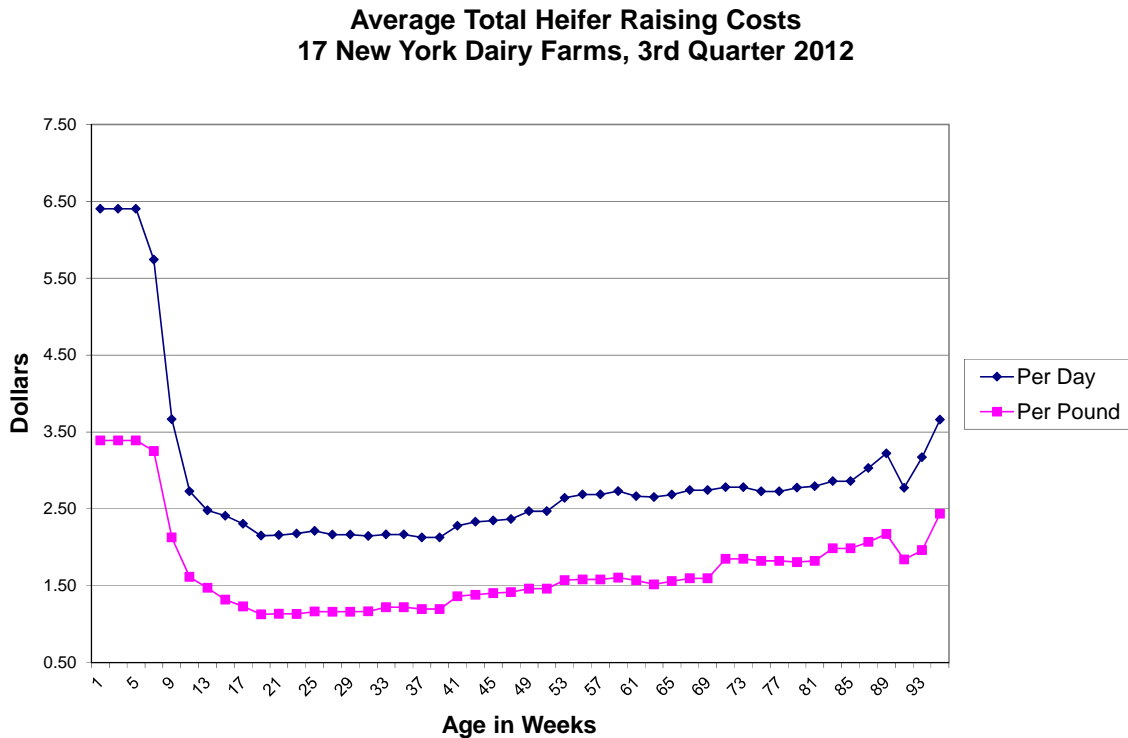
Table 2

COST PER DAY PER ANIMAL 17 New York Dairy Farms, 3 rd Quarter 2012				
Cost per Day per Animal	Average	Percent of Total	Inter-Quartile Range	
Feed Total	\$1.597	53.3%	\$1.296	\$2.051
Grown Feed	\$1.051		\$0.777	\$1.314
Purchased Feed	\$0.622		\$0.346	\$1.068
Labor	\$0.359	12.0%	\$0.215	\$0.509
Bedding	\$0.131	4.4%	\$0.028	\$0.293
Health	\$0.061	2.0%	\$0.028	\$0.128g
Breeding	\$0.069	2.3%	\$0.036	\$0.107
Trucking	\$0.004	0.1%	\$0.000	\$0.014
Insurance	\$0.002	0.1%	\$0.000	\$0.007
Machinery Operation	\$0.077	2.6%	\$0.034	\$0.152
Machinery Ownership	\$0.047	1.6%	\$0.022	\$0.073
Building Operation	\$0.040	1.4%	\$0.018	\$0.070
Building Ownership	\$0.130	4.3%	\$0.052	\$0.231
Manure Storage Operation	\$0.001	0.0%	\$0.000	\$0.007
Manure Storage Ownership	\$0.008	0.3%	\$0.000	\$0.027
Manure Spreading	\$0.064	2.1%	\$0.024	\$0.116
Custom Boarding	\$0.086	2.9%	\$0.000	\$0.414
Professional Services and Fees	\$0.001	0.0%	\$0.000	\$0.006
Non-Performance Expenses	\$0.113	3.8%	\$0.034	\$0.179
Interest on Daily Investment	\$0.205	6.8%	\$0.182	\$0.236
Total	\$2.995		\$2.662	\$3.403
Number of Heifers	636		333	1,305
Age, Months	23.0		20.3	25.0
Calving Weight, Pounds	1,302		1,208	1,368
Average Daily Gain	1.75		1.58	1.96
All Heifers per Labor Hour	39.4		26.4	57.6
Pre-Weaned Heifers per Labor Hour	11.6		6.2	21.7
Post Weaned Heifers per Labor Hour	59.0		38.8	102.1
Total Investment in Animal	\$2,232		\$2,010	\$2,413
% Non-Completion Rate	10.6		4.2	17.7
Cost per Worker	\$39,964		\$27,655	\$48,845

Table 3

COST PER POUND OF GAIN 17 New York Dairy Farms, 3 rd Quarter 2012				
Cost per Pound of Gain	Average	Percent of Total	Inter-Quartile Range	
Feed Total	\$0.918	53.4%	\$0.748	\$1.195
Grown Feed	\$0.600		\$0.427	\$0.775
Purchased Feed	\$0.358		\$0.193	\$0.655
Labor	\$0.206	12.0%	\$0.124	\$0.303
Bedding	\$0.074	4.3%	\$0.017	\$0.152
Health	\$0.034	2.0%	\$0.016	\$0.069
Breeding	\$0.040	2.3%	\$0.021	\$0.063
Trucking	\$0.002	0.1%	\$0.000	\$0.009
Insurance	\$0.001	0.1%	\$0.000	\$0.003
Machinery Operation	\$0.044	2.5%	\$0.020	\$0.087
Machinery Ownership	\$0.027	1.6%	\$0.013	\$0.042
Building Operation	\$0.023	1.4%	\$0.010	\$0.042
Building Ownership	\$0.074	4.3%	\$0.031	\$0.132
Manure Storage Operation	\$0.001	0.0%	\$0.000	\$0.004
Manure Storage Ownership	\$0.005	0.3%	\$0.000	\$0.017
Manure Spreading	\$0.036	2.1%	\$0.015	\$0.064
Custom Boarding	\$0.049	2.8%	\$0.000	\$0.240
Professional Services and Fees	\$0.001	0.0%	\$0.000	\$0.003
Non-Performance Expenses	\$0.066	3.9%	\$0.019	\$0.107
Interest on Daily Investment	\$0.118	6.9%	\$0.099	\$0.135
Total	\$1.718		\$1.515	\$1.890
Number of Heifers	636		333	1,305
Age, Months	23.0		20.3	25.0
Calving Weight, Pounds	1,302		1,208	1,368
Average Daily Gain	1.75		1.58	1.96
All Heifers per Labor Hour	39.4		26.4	57.6
Pre-Weaned Heifers per Labor Hour	11.6		6.2	21.7
Post Weaned Heifers per Labor Hour	59.0		38.8	102.1
Total Investment in Animal	\$2,232		\$2,010	\$2,413
% Non-Completion Rate	10.6		4.2	17.7
Cost per Worker	\$39,964		\$27,655	\$48,845

Figure 1



Cost Per Pound of Gain

The average raising cost per pound of gain was \$1.718, with an inter-quartile range of \$1.515 to \$1.890 (Table 3). This cost was based on an average of 1.75 pounds of gain per day, with an inter-quartile range of 1.58 to 1.96 pounds per day. The average daily rate of gain was based on a combination of actual and estimated weights at birth and at calving as more farms are utilizing scales within the replacement program. Feed costs were \$0.918 per pound of gain, ranging from \$0.748 to 1.195 per pound of gain. Labor costs contributed another \$0.206 per pound of gain, with all remaining expenses equaling \$0.594

The average cost per pound of gain had the same trend as did cost per day per heifer: \$3.13 per pound of gain prior to weaning, \$1.10-\$1.30 range per pound of gain from weaning to breeding, and approximately a \$1.50 from breeding to calving (Figure 1). Feed and labor costs had the largest impact on costs as the heifer grew. These two costs represent 65.4% of the raising cost of a heifer. Feed costs were in the \$1.85-\$1.95 per lb. of gain range prior to weaning, lowered into the \$0.60 per lb. of gain range after weaning, and steadily increased towards \$1.40 per pound of gain as the animal neared calving. (Figure 2) Switching to a non-fluid based feed when the animal was weaned lowered feed costs. The biological changes in body composition and organ size that the animal went through during puberty and breeding led to a higher feed cost per pound of gain.

Figure 2

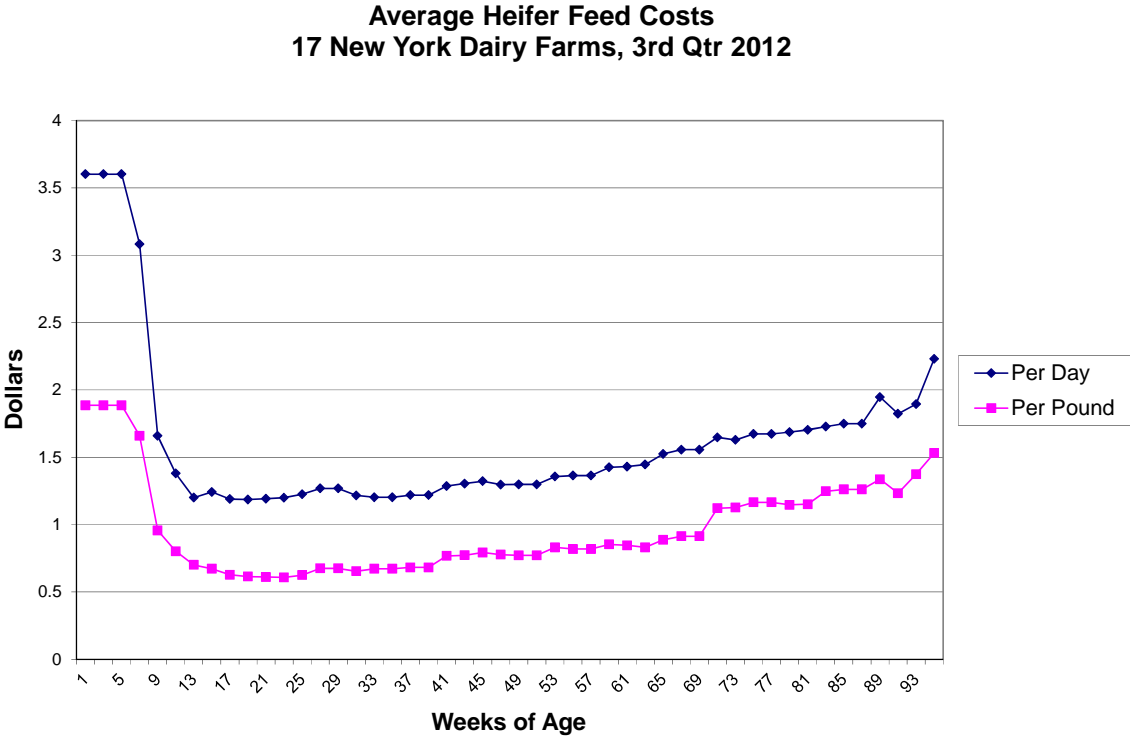
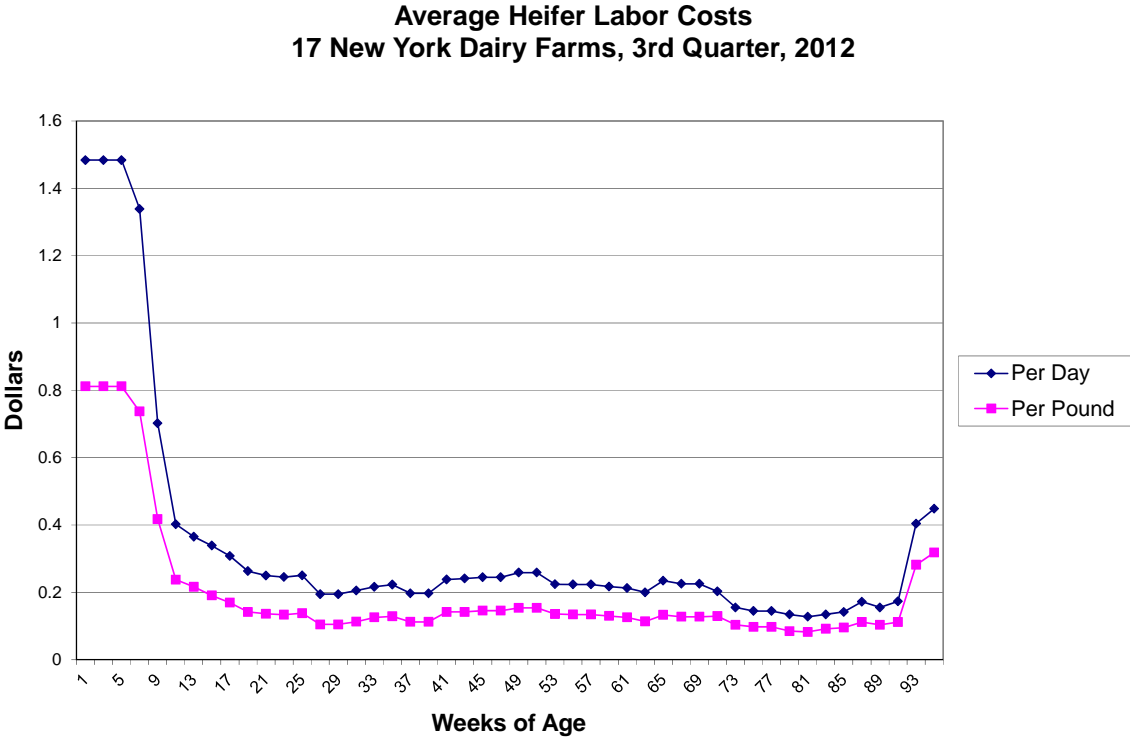


Figure 3



Labor costs demonstrate the impact of changing labor requirements on costs of raising heifers. Labor costs started at just over \$0.80 per pound of gain during milk feeding, then dropped dramatically to approximately \$0.11-\$0.13 per pound after the animal was weaned. Around puberty and breeding, labor increased slightly, and then fell back down to around almost \$0.10 per pound until calving. (Figure 3) This reflects the decrease in labor required to maintain heifers after weaning.

BREAKDOWN OF EXPENSES BY STAGE OF GROWTH

The periods from birth to weaning, weaning to puberty, puberty to breeding and breeding to calving were used to further analyze dairy replacement programs. Table 4 shows the breakdown for each of these groups by weight, the average cost per pound of gain, and the average total raising costs per heifer. Costs are broken down into feed costs, labor costs, and all other costs.

The period of birth to 200 pounds represented 15.4% of the total costs, but only accounted for 8% of the weight gain, with an average cost per pound of gain of \$3.13. The weaning to puberty period was 38% of the growth of the animal, but only 27.5% of the total cost. This equated to an average of \$1.233 cost per pound of gain. The breeding stage added another 12% of growth, and 10.1% of cost, with this stage averaging of \$1.507 cost per pound of gain. While the animal was bred the greatest cost occurred, representing 47% of the total cost and 35% of the growth. The average cost per pound of gain during this stage was \$2.209

Table 4

Breakdown of Costs of Raising Heifers by Stage of Growth 17 New York Dairy Farms, 3 rd Quarter 2012, New York				
Per Pound of Gain				
	Stage of Growth			
	Birth to 200 Lbs	201-700 lbs	701-850 lbs	851-Calving
Feed	\$1.714	\$0.678	\$0.811	\$1.122
Labor	0.805	.140	0.125	0.230
All Other Costs	0.610	.415	0.571	0.857
Total	\$3.128	\$1.233	\$1.507	\$2.209
By Total Raising Cost				
	Stage of Growth			
	Birth to 200 Lbs	201-700 lbs	701-850 lbs	851-Calving
Feed	\$188.5	\$339.0	\$121.7	\$538.2
Labor	88.5	69.9	18.8	108.9
All Other Costs	67.1	207.4	85.6	405.7
Total	\$344.1	\$616.3	\$226.1	\$1,053.1
% of Total Cost	15.4%	27.5%	10.1%	47.0%
% of Total Growth	8%	38%	12%	35%

FEED COSTS

Feed cost was the largest expense associated with raising heifers. With an average of \$1,112 per heifer, feed cost represented 53.3% of the total costs associated with the dairy replacement program. To further analyze feed costs, costs were determined only for the period when the animals were on the farm, and also broken down between grown and purchased feed (Table 5). Please note that these numbers will be slightly higher as they represent the feed costs while the animal was on the farm and on feed. Time spent at a custom grower is not included. While the feed costs reported in Tables 2 & 3 are correct for the breakdown of where costs were incurred to grow the heifer on a per day or per pound of gain basis, they don't represent what the animal actually consumed while on the farm as time spent and weight gained at the custom grower are included in these tables.

Grown feed, which includes corn silage, haylage, dry hay, and any grain that was grown on the farm along with raw milk if fed to the wet calves, averaged \$701 per heifer, or 63.5% of the total feed costs. The inter-quartile range was from \$494 to \$938 per heifer.

For this study, producers valued grown forages based upon estimates of their costs to grow the forages.

Purchased feed, which includes milk replacer, all purchased grains and any purchased hay, averaged \$411 per heifer, or 36.5% of the total feed costs. The inter-quartile range was from \$242 to \$653 per heifer. The farms participating in this study didn't feed any purchased corn silage or haylage. For purchased ingredients, an average of the prices paid over the 3rd quarter was utilized to determine the price per ton.

Table 5

Feed Summary 17 New York Dairy Farms, 3 rd Quarter 2012				
	Average		Inter-Quartile Range	
Daily Weight Of Gain, On-Farm ¹	1.749		1.581	1.956
Feed Conversion Ratio(Lbs of Gain/Lbs of DM)	0.118		0.092	0.149
Average Daily Dry Matter Intake per Animal	15.18		12.2	19.161
Feed Cost per Day per Animal, On-Farm	\$1.673		\$1.423	\$2.051
Feed Cost per Pound of Gain, On-Farm	\$0.958		\$0.839	\$1.195
Feed Cost per Lb. of Dry Matter	\$0.112		\$0.089	\$0.142
Total Days Analyzed	668		546	739
Total Feed Costs per Animal Completing System	\$1,112		\$923	\$1,464
Grown Feed vs Purchased				
Per Animal Completing				
Grown Feed	\$700.7	63.5%	\$493.8	\$938.4
Purchased Feed	\$410.9	36.5%	\$241.8	\$653.5
Per Animal per Day				
Grown Feed	\$1.051		\$0.777	\$1.314
Purchased Feed	\$0.622		\$0.346	\$1.068
Per Pound of Gain				
Grown Feed	\$0.600		\$0.427	\$0.775
Purchased Feed	\$0.358		\$0.193	\$0.655
Number of Animals in System, On Farm	593		333	1,070
Weight Gained in System, On Farm, Pounds	1,163		956	1,272

¹Information summarized for the period when the animal was on farm and consuming feed. Not including time animal may have been boarded off the farm.

On the participating farms, while the majority of animals were raised on farm, not 100% of the animals were on farm for the whole system. For the time that the animals were on farm and not being custom raised, the animals averaged the following:

- Average daily gain of 1.749 pounds
- Feed conversion ratio of 0.118
- Average daily dry matter intake of 15.18 pounds
- Feed costs per animal per day = \$1.673
- Feed costs per pound of gain = \$0.958

Whole Milk and Milk Replacer Costs

One of the significant feed factors while raising replacements is when they are on liquid feed. Consider that 15.8% of the total feed cost in this study was due to the value of the whole milk or milk replacer fed during the first couple months. Out of these 17 farms, 7 were feeding milk replacer, using an average 1.78 pounds of powder per calf per day. With an average cost of \$3,008 per ton, this equaled \$1.86 per animal per day for the milk replacer. Of these 7 farms, 2 also utilized whole milk. For the 5 farms that only fed milk replacer, they averaged 2.09 lbs per calf per day. For the 5 farms feeding only milk replacer, the average cost per animal per day equaled \$3.11.

Twelve farms fed whole milk to their calves, feeding on average 17.13 lbs of milk per calf per day. For the 10 farms that only fed whole milk, the average amount fed per calf per day was 18.27 pounds. For this study, milk fed to calves was charged at a value of \$17.00 per cwt to reflect the net milk price value for milk in the fall of 2012. With \$17.00 per cwt of milk equaling \$340 per ton, this equaled \$2.91 per calf per day for the whole milk. This feed cost doesn't include any costs for pasteurizing the milk, which some of the farms utilized. Pasteurization costs would be included in the appropriate expenses areas, such as supplies, machinery, and utilities.

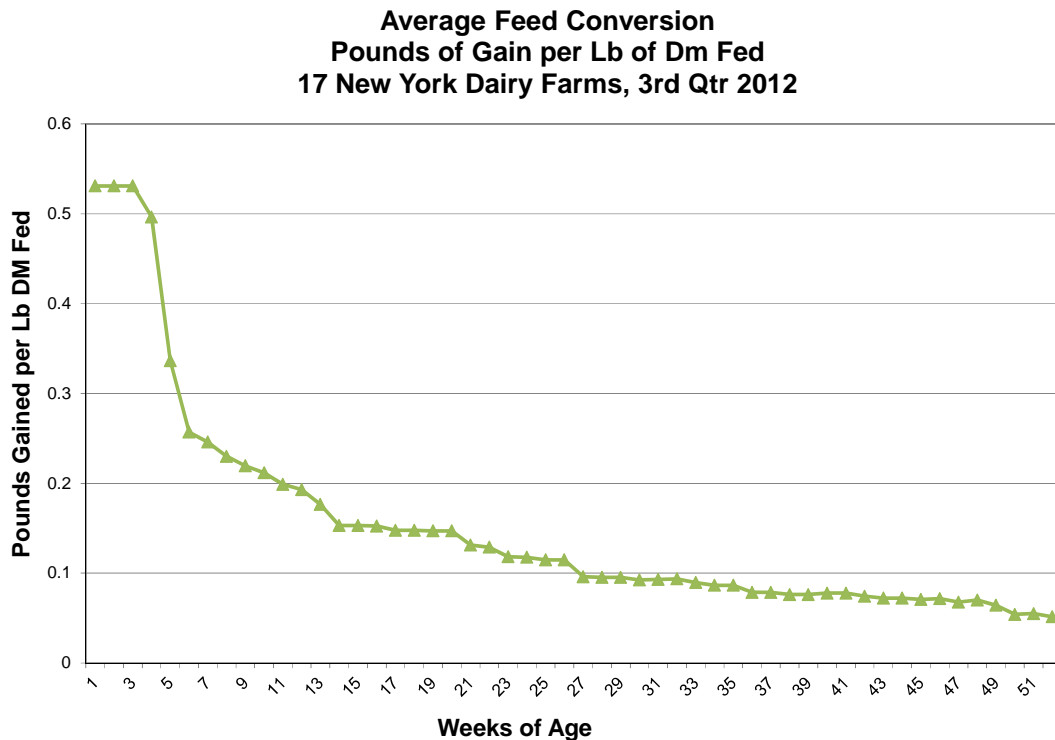
For the purpose of this study, \$17.00 per cwt was utilized for the whole milk reflecting the assumption that the milk was 100% saleable. However, the whole milk used on these farms was made up of a combination of saleable and waste milk. On these 12 farms, 51.3% of the milk fed was considered saleable and 48.7% was considered waste milk. The spread ranged from 100% waste milk to 100% saleable milk. There is continued debate on what value should be assigned to waste milk fed to calves.

For these twelve farms, the feed costs were re-calculated utilizing \$4 per cwt. or \$80 per ton, for the portion of the milk that was considered waste. This change in the cost of the whole milk that was waste milk lowered total costs to raise the animal by \$78.39 per animal. This is a difference of \$62.96 in feed costs, and \$15.43 in opportunity costs.

Feed conversion plays an important role in determining feed costs for raising dairy replacements. Figure 4 shows how feed conversion changed as the animals moved through the dairy replacement program. While on liquid feed, the animals averaged the highest conversion ratio for feed delivered to the animal. When the animal transitioned

from liquid feed to dry feed, and as the animal grew, feed conversions slowed down, steadily decreasing as the animal got larger and older.

Figure 4



LABOR EFFICIENCY

Labor expense was the second largest expense associated with raising heifers and the expense with the greatest range. Measuring labor efficiency is one way to analyze how well labor is being used. To analyze labor associated with dairy replacements, a measure called "heifers per labor hour", is used. Heifers per labor hour measures how many dairy replacements are taken care of in one labor hour. This measure includes time to feed, clean, bed, move, and manage heifers. The higher the value, the more efficient labor is being utilized. To calculate the measure, the total number of hours of labor used was determined, placed on a per day basis and then divided into the average daily number of heifers on the farm.

The average heifer per labor hour for these 17 New York dairy farms was 39.4, with the six highest efficiency farms averaging 51.7. The average for the six lowest efficiency farms was 30.0. To further analyze labor efficiency within the dairy replacement program, heifers per labor hour was determined for pre-weaned and post-weaned animals. The average pre-weaned heifers per labor hour were 11.6, while post-weaned heifers per labor hour was 59.0. The difference between the top and bottom groups of farms for pre-weaned heifers per labor hour was almost double, ranging from 8.53 to

15.3. The difference for the post-weaned heifers was even greater, with the lowest group averaging 47.4 heifers per labor hour and the highest group averaging 77.7 heifers per labor hour.

Table 6

Labor Evaluation 17 New York Dairy Farms, 3 rd Quarter 2012				
	Average	Low Third Farms	Middle Third Farms	High Third Farms
Number of Heifers	636	613	644	530
All Heifers per Labor Hour	39.4	30.0	36.0	51.7
Pre-Weaned Heifers/Labor Hour	11.6	8.53	10.9	15.3
Post-Weaned Heifers/Labor Hour	59.0	47.4	50.5	77.7
Corresponding Labor Costs/Animal	\$251.5	\$298.4	\$289.42	\$172.96
Cost per Worker Equivalent	\$39.964	\$39,803	\$41,801	\$38,591
Worker Equivalents per 600 Heifers	2.14	2.85	2.34	1.65

A second method used to measure the total labor requirements for the dairy replacement enterprises was to calculate worker equivalents for the enterprise. On these 17 New York dairy farms, an average of 2.14 worker equivalents was used within the heifer enterprise. One worker equivalent is defined as one person working 55.2 hours per week for 50 weeks, or a total of 2760 hours per year. Using the average of 636 heifers, the average high efficiency group would need 1.65 worker equivalents. The average low efficiency group would need 2.85 worker equivalents. The third measure used to evaluate labor was total labor cost, which averaged \$251.5 per animal and ranged from \$143 to \$370.

Combining these measures indicates potential cost reductions on dairy farms. As heifers per labor hour increased, worker equivalents decreased and total costs of labor per animal decreased. If labor efficiency can be improved, less labor will required in the heifer enterprise and the cost of raising heifers will decline.

TOTAL ECONOMIC COST

The approach taken for summarizing the costs associated with raising heifers in this project includes economic costs for all inputs that are utilized by the dairy replacement program, or a full cost allocation approach. Non-performance expense and interest on investment are economic charges that are assigned to the replacement program. Ownership costs associated with capital investment are non-cash costs that are also assigned to the replacement program. The cost value assigned to the forage that is utilized by the replacement program may or may not accurately reflect the costs of production for the feed on the participating farms.

For dairy farms that also raise their own heifers, there also may be some synergies associated with combining the replacement program with the dairy enterprise. Some potential synergies are:

- The ability to manage forage inventories to feed lower quality forage to the replacement program, while maximizing the quality of forage fed to the dairy cattle.
- A potential use for sweepings from the dairy herd.
- The potential to fully utilize management resources on the farm.
- The ability to spread fixed costs over more activities.
 - Utilize machinery more fully
 - Utilize existing facilities
 - Utilize available land base

While potential synergies exist for farms that are raising dairy replacements, synergies will vary in value for individual farms. Too, these values are difficult to estimate. Some of the questions that have come up when discussing this topic with individual farms are:

- What is the value obtained by having the ability to not feed the lowest quality feed to the milking herd while still feeding it to the heifers?
- How much is it really costing to produce all the feed needed for both milking age animals and replacements while properly handling the manure?
- Are other cost areas, such as high labor costs due to poor facility designs, offsetting synergies that may be present?

For farms that are analyzing their dairy replacement program and thinking about changing heifer raising practices, or thinking about whether they should be even raising their heifers, these are important questions to think about. Determining the economic costs associated with the dairy replacement program is always the first step in analyzing the replacement program.

SUMMARY

Dairy replacement programs within dairy farms are one of the largest expenses within the dairy. For these 17 above average herd size farms with high levels of management, their dairy replacements entered the herd with a total investment of \$2,232 per animal, including the value of the animal when it was born. These animals are calving at 23.0 months of age and weighing 1,302 pounds. The animals averaged 1.75 pounds of gain

per day at a total raising cost of \$2.995 per day per heifer, or \$1.72 per pound of gain. Feed costs were the most significant cost, followed by labor. These two costs comprised 65.4% of the total cost to raise a dairy replacement. Significant changes in cost per day per heifer and per pound of gain occurred when the animal was weaned and when the animal went through puberty. There was also a large range in total costs to raise heifers, with the inter-quartile range from \$2,010 to \$2,413.

Labor efficiency on these farms is considered to be above average and equaled 39.4 heifers per labor hour. Housing systems used, design and location, played a significant role in determining the labor efficiency for the replacement enterprise.

The results reported from this study are considered to reflect above average heifer management systems, and only represent the results achieved by the seventeen participating farms. Size of operation, housing system, rate of gain, calving age, and level of management all impact the total cost to raise a dairy replacement. Depending upon these factors, individual farms may or may not achieve the performance levels achieved by these seventeen farms.

Explanation of Expenses Calculated

Feed

Feed expense is the cost of all feed that is fed to the animal, by group as defined by the participating farm. Feed usage is based on the average amount fed per day per animal for each group. The cost is determined by utilizing costs associated with growing forages, 3 month averages for purchased grain & concentrates, purchased hay & milk replacers, and \$17 per cwt. for whole milk to reflect the opportunity cost of the net milk price for milk sold.

Bedding

Bedding expense is the cost of the bedding used for the group. This cost is determined by the number of times the group is bedded, the amount of bedding used each time, and the purchase price of the bedding, or the cost of production if grown on the farm.

Health

Health expense is the cost of all health related expenses that can be attributed to the animals while in specific groups. These expenses can include vaccinations, worming programs, and pregnancy checks and other expenses incurred for every animal. This expense also includes treatments used during the year to treat individual animals for specific issues, such as scours, along with supplies utilized to treat animals.

Breeding

Breeding expense is the cost of getting the animal pregnant. This number consists of the breeding costs associated with artificial insemination along with the costs of a bull. The artificial insemination costs consist of the average semen cost and service fee weighted by the conception rate. The cost of the bull is determined by the original cost of the bull along with the amount per day that it costs to maintain the bull on the farm.

Labor

Labor expense is the cost of the labor used during the year in the heifer enterprise. The cost is based on the number of hours per day spent on the different groups of heifers and the hourly wage rate, including all benefits. Daily, weekly, and monthly labor requirements by employee and task were determined to develop the number of hours of labor utilized within the replacement program. Labor hours associated with producing feed or spreading manure from storage wasn't counted in this expense.

Trucking

Trucking expense is the cost of picking up, delivering, or moving animals between locations. This cost is based on the number of trips made, the miles round trip, and a round trip charge per mile.

Insurance

Insurance expense is the cost of any insurance that is carried on dairy replacements. This doesn't include insurance expenses associated with buildings or machinery.

Machinery Operation

Machinery operation expense is the cost of the equipment associated with the feeding, bedding, and manure removal for the heifers. The cost includes the cost of fuel, oil, and repairs, which are determined from actual records or based on horsepower, life, and cost of machinery. Machinery costs were assigned to different groups of heifers based on usage levels.

Machinery Ownership

Machinery overhead expense includes the fixed costs associated with the equipment used in the heifer enterprise. These costs are the depreciation, opportunity interest costs, and the insurance on the equipment. The costs are determined from farm records or estimated from the amount of investment and useful life of the equipment, and assigned to the appropriate group based on usage.

Building Operation

Building operation expense includes the repair costs of maintaining buildings, fences, etc., along with utility costs. Building operation expenses were determined by facility and assigned to the appropriate group.

Building Ownership

The building overhead expense includes the fixed costs associated with the buildings used by the heifer enterprise. These costs include depreciation, opportunity interest, taxes, and insurance. The cost were determined by facility and assigned to the appropriate group.

Manure Storage Operation

Manure storage operation expense includes the repair and utility costs associated with maintaining manure storages. The costs were determined by storage complex and assigned to the appropriate groups of heifers.

Manure Storage Ownership

Manure storage ownership expense includes the fixed costs associated with the manure storage complex. These costs include depreciation, opportunity interest, taxes, and insurance. The cost were determined by storage complex and assigned to the appropriate group of heifers.

Manure Spreading

Manure spreading expense is the expense associated with spreading heifer manure back onto the land. Costs were determined by number of loads spread per year, loads per hour, and cost per hour for manure spreading operations. Costs were determined by storage complex or spreading operation and assigned to the appropriate group.

Professional Services and Fees

Professional services and fees expense includes those costs associated with forage testing, nutritional consulting, and business consulting assigned to all heifers within the replacement program.

Non-Performance Expense

Non-performance expense is the cost of the time and money that was invested in an animal that died on the farm or was sold before completing the replacement program. This number is based on the number of days the animal was on the farm and the cost per day for the groups on the farm. The expense for the animal(s) that died or were sold as non-performers is assigned to the animals in the group from which the animal leaves.

Interest on Investment

Interest on investment expense is the interest cost for the operating capital that is invested in the animals over time. It is based on an annual rate of return of seven percent, the beginning value of the animal, and the average investment in the animal by group. This expense doesn't include the costs associated with capital investments in buildings and machinery, which are calculated in the corresponding ownership cost areas.

OTHER A.E.M. EXTENSION BULLETINS

EB No	Title	Fee (if applicable)	Author(s)
2014-01	Cost of establishment and production of V. vinifera grapes in the Finger Lakes region of New York - 2013		Gomez, M.
2013-17	New York Economic Handbook, 2014		Extension Faculty and Staff
2013-16	Dairy Farm Business Summary, Northern New York Region, 2012	(\$12.00)	Knoblauch, W., Conneman, G., Dymond, C., Karszes, J., Howland, B., Buxton, S., Kiraly, M., and K. Shoen
2013-15	Dairy Farm Business Summary, Hudson and Central New York Region, 2012	(\$12.00)	Knoblauch, W., Conneman, G., Dymond, C., Karszes, J., Howland, B., Buxton, S., Kiraly, M., and K. Shoen
2013-14	Eastern Broccoli Crop Budgets		Atallah, S. and M. Gómez
2013-13	Dairy Farm Business Summary, New York Small Herd Farms, 120 Cows or Fewer, 2012	(\$16.00)	Knoblauch, W., Dymond, C., Karszes, J., and M. Kiraly
2013-12	Dairy Farm Business Summary, Western New York Region, 2012	(\$12.00)	Knoblauch, W., Dymond, C., Karszes, J., Hanchar, J., Grace, J., Carlberg, V., and J. Petzen
2013-11	Dairy Farm Business Summary, New York Large Herd Farms, 300 Cows or Larger, 2012	(\$16.00)	Karszes, J., Knoblauch, W. and C. Dymond
2013-10	Milking Center Cost Study, New York State, 2010-2011		Howland, B., Karszes, J. and K. Skellie
2013-09	Marketing Module 8 - Promotion		Gómez, M. and S. Cuellar-Healey
2013-09i	Marketing Module 8 - Promotion Example		Cuellar-Healey, S. and M. Gómez

Paper copies are being replaced by electronic Portable Document Files (PDFs). To request PDFs of AEM publications, write to (be sure to include your e-mail address): Publications, Department of Applied Economics and Management, Warren Hall, Cornell University, Ithaca, NY 14853-7801. If a fee is indicated, please include a check or money order made payable to Cornell University for the amount of your purchase. Visit our Web site (<http://dyson.cornell.edu/outreach/#bulletins>) for a more complete list of recent bulletins.