Dairy Profits II

Understand and Value, the Value of Labor

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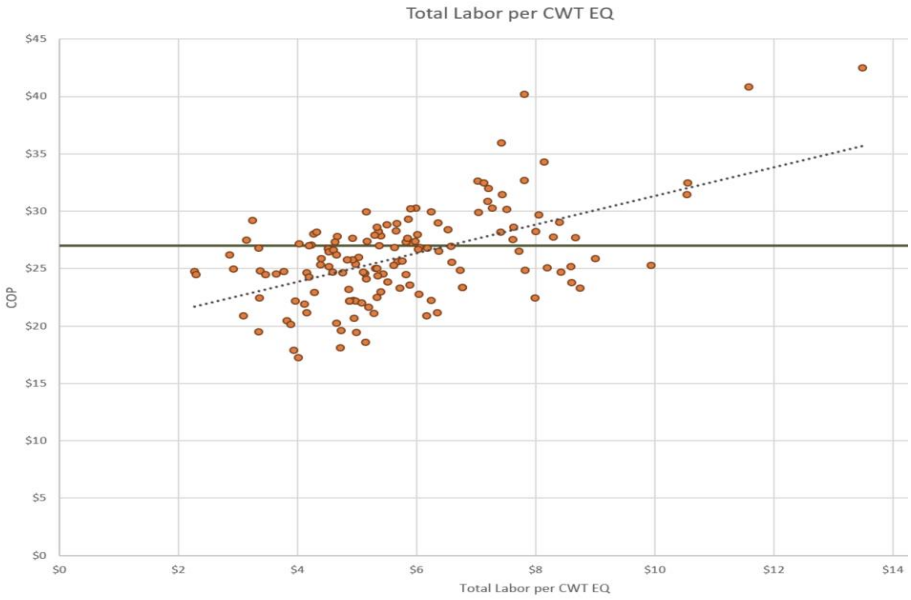
"Live and work, not like the others when young, so you can really live, not like the others, when older"

There is a strong correlation (2:1) between labor cost per cwt. equivalent and profitability in Iowa State University Extension and Outreach's data sets of organic farms across the country. The data in the following chart spans four years of on-farm data. Not to downplay milk production per cow or feed costs per cwt. equivalent, but labor efficiency continues to become ever important to the success of the dairy farm as labor cost and availability continues as more important issues. Labor efficiency is important for the young and old alike but, thanks to the time value of money, it deserves very special attention for the younger dairy producers.

This correlation between labor costs per cwt. eq. and profitability was twice as strong as purchased feed costs per cwt. eq. and profitability. Again, not to downplay feed costs or milk production per cow, but simply saying that labor efficiency deserves much more respect for its role in dairy farm profitability than it currently receives in the mindset of most dairy producers. It is important to use a full cost of production when analyzing labor efficiency relative to profit as using Net Farm Income, even adjusted for inventory at times can show misleading results.

Table 1. Total Labor Costs per Cwt. Equivalent versus Cost of Production



So, in order to increase the importance of labor, we must understand labor is an input much like capital, admittedly with a personal, human component. Labor efficiency often takes capital expenditure to optimize and many might feel they cannot afford the investment to become more labor efficient. Thus, labor efficiency is both an investment and a choice. When data shows the high correlation with total labor costs per cwt. eq. and cost of production, maybe labor efficiency should be questioned as to how can one NOT afford to be labor efficient? It is a question of time and capital investment to reduce labor costs and increase labor efficiency in the long run. This is especially important for younger producers as labor tends to be what they have the most of and the time value of money is on their side.

Consider the following example:

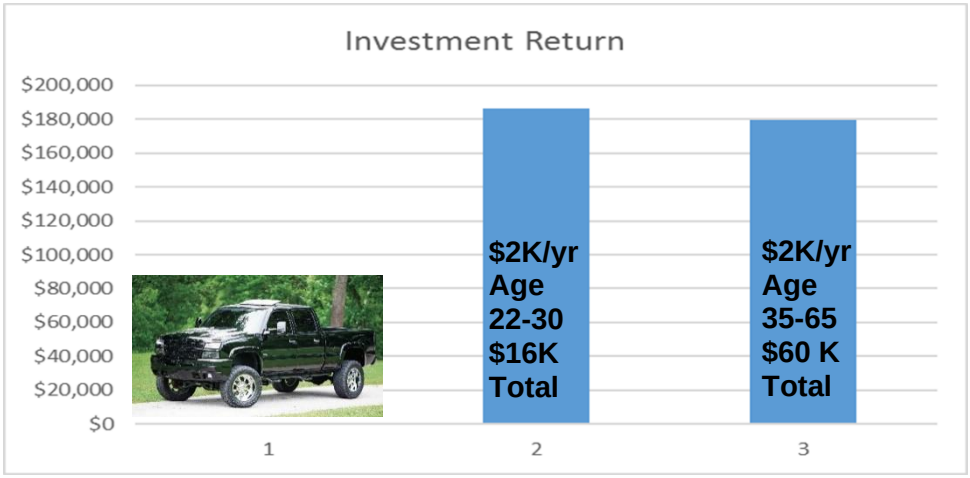
Three young people earn money dairy farming, illustrated in the chart below. The first borrows money to spend $40,000 on a new truck that only depreciated over the course of 15 years and then did it again so in the long run, when that person reached retirement age, they didn't have much to show for it. Their investment went into something that didn't appreciate or grow. One might say the person made decisions to invest in a very depreciable asset that put them on the wrong side

of interest early in life. The wrong side of interest is when one has to pay it versus collect or earn it, unless one makes more from the borrowed money than interest paid.

The second young person, invested $2,000 per year from age 22-30, or $16,000 total at 6% interest and ended up with approximately $183,000 at age 65. The third young person waited until age 35 to begin investing $2,000 per year and did so until age 65. This person invested a total of $60,000, versus person two's $16,000 earlier in life, and ended up with approximately $180,000 or about $3,000 less than person number two. Moral of the story is that the money made early in life may be the most important money made because of the time value of it.

Let us extrapolate this to dairy labor. A young person with little assets might only have their labor to turn into money and much of the same logic applies. The labor return you receive early in life may be some of the most important money made over the course of time. Thus, it makes sense, if available, to start one's dairy career in a labor efficient situation as one only has so much labor to turn into assets over time. I realize some beginning dairy producers are limited in their options to start their dairy careers and might have to choose a labor inefficient situation, else might not be able to start.

Three technologies of particular interest as a means



to save labor on dairy farms is the milking system, the feeding system (especially grazing and TMR/PMR), and the housing system. These systems not only impact labor efficiency but also milk production, capital and other efficiencies and costs. The focus here, though, is labor efficiency beginning with the milking system as the milking part of dairying is where many spend so much time, many much longer than one would have to, often not aware of other options to become more labor efficient.

Consider the example in table below. Current milking system types have cows milked per person per hour that range widely. For instance, stall barn or small herringbone parlors often average about 22 cows per person per hour or 825 pounds of milk harvested per person hour. Older and midsized parlors with outdated designs and bottlenecks often average about 44 cows per person per hour or 1,650 pounds of milk harvested per person hour. More modern parlors, even those designed with low cost in mind, can achieve a good average of 66 cows per person per hour or 2,475 pounds of milk harvest per person hour. This is with milk production at 75 pounds per cow per day.

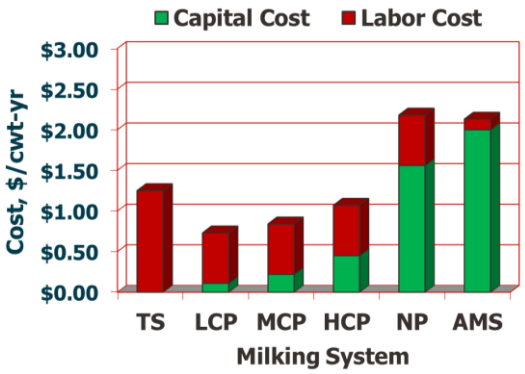
Milking 2x		Labor @ $15/hour	
cows/person/hr	lbs milk/hr	$/cow/day	$/cwt
22	825	$1.36	$1.82
44	1,650	$0.68	$0.91
66	2,475	$0.45	$0.61

The cost to milk the cows for labor only in a Low Cost TRANS Iowa Parlor increases from $0.45 per cow per day to $1.36 per cow per day compared to milking in a stall barn or small, outdated parlor. The cost per cwt. in this scenario increases from $0.61 to $1.82 per cwt. Hopefully, this highlights a need to better understand the labor efficiency of the milking system to best decide a milking system that leads to higher profits long term. Granted, some milking systems might fit certain production systems better than others. As robotic milking has been adapted to all our major production systems, the Low Cost TRANS Iowa Parlor has as well. Both of these systems can get the job done but a significant difference is cost per cwt. to get the job done.

Milking System Options, Costs and Efficiencies

The graph below highlights the capital and labor cost of various milking systems. It is to be noted that rotary milking parlors and rotary robotic milking are being researched for future inclusion and have great merit for certain dairy producers, including those using grazing and/or organic production techniques.

The systems below include Tie Stall Barns (TS); Low Cost Parlors (LCP); Medium Cost Parlors (MCP); High Cost Parlors (HCP); New Parlors (NP); and Automatic Milking Systems (AMS). The labor and capital cost of each system is accounted for in the dollar cost per cwt. per year. Realize each system has its own range of costs. On both ends of the milking system spectrum, the TS system can on its higher cost side (>$2/cwt.) could be higher cost, simply due to labor as an AMS at its lowest cost (~$1.75/cwt.).



The target is a milking system labor efficient enough to milk cows for around $1 per cwt for profit reasons. If higher cost systems are chosen, let it be for reason of being able to afford or quality of life reasons.

A second look at milking costs for a 140 cow herd size is depicted below that shows a TS cost pretty competitive with AMS and over double the cost of a mid-sized LCP. To be noted is the last column of a Double 8 (D8) MCP for a 660 cow herd that was run very efficiently for 22 hours per day with a cost coming in at $0.81 per cwt. The more cows put through the system the more one can afford to spend.

	Stall Barn	Low Cost Parlor	High Cost Parlor	Robot	D8 22hr
Cost per cwt	$2.17	$0.93	$1.98	$2.33	$0.81
% of Milk Price	12%	5%	11%	13%	5%

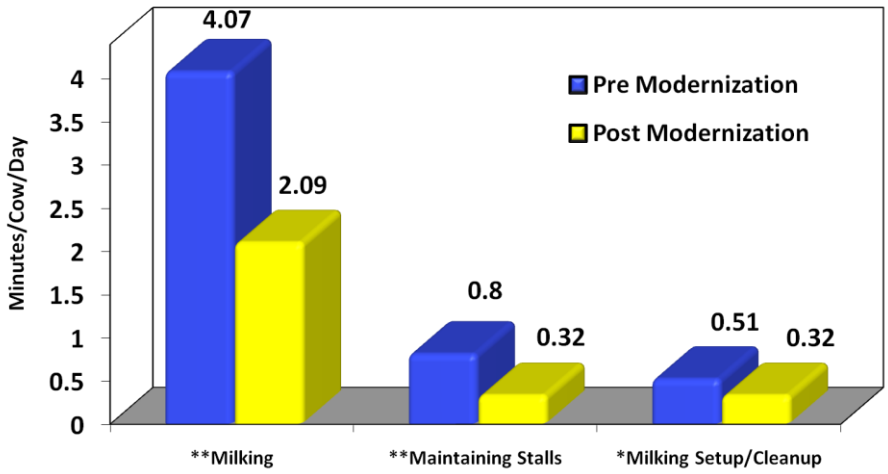
It is important to look at the percent of milk price being used to milk cows. In the example on previous page, the Stall Barn system is spending 12% of its milk check and the Robot is spending 13% of its milk check to milk the cows. A lofty goal is for a system to spend only 5% of its milk check to milk the cows. Consider if a conventional milk price is $15 per cwt. at a point in time and the producer is spending $3 per cwt. (20% of milk check) to milk cows, leaving $12 per cwt. for all other expenses. In comparison, if an organic milk price is $30 per cwt. and the producer is spending $1 per cwt. (3.3% of milk check) to milk cows, there is $29 per cwt. (96.7%) left for all other expenses. These far end of spectrum examples shed light and the importance of the milking system and margin for profit. And if we consider risk and resiliency in low milk price years, the extra $1-$2 per cwt. to milk cows may be the difference of whether or not the farm is even profitable or able to meet family living needs.

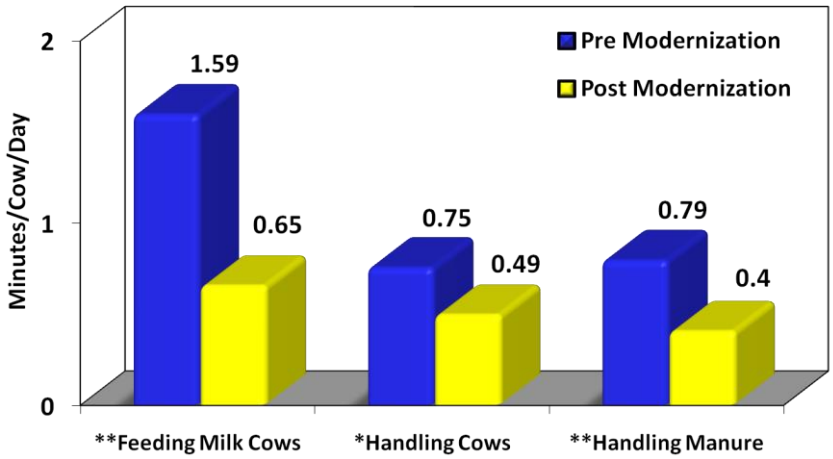
The TS system warrants separate discussion for not just labor efficiency reasons but cow and consumer perception reasons as well. The TS system at $1.25 per cwt. accounts for labor cost only, no investment cost included. More freedom of movement for cow comfort that gives 32” chain length and a neck rail 44”-48” high and 6”-8” in towards the feed alley is often needed along with comfortable mattress, sand or other deep bedding. Dairy producers considering building a new TS barn nowadays, should really consider the TS barn’s labor efficiency, cow comfort and freedom, and consumer perception realities.

For those milking in TS systems, realize newer facilities built to today’s specifications typically garner 6-8% increased milk production while labor per cow is often cut in half. A Wisconsin modernization study showed producers that modernized to a free stall system reduced labor in half with all the activities listed in table below:

The total time spent per cow per day was 8.51 minutes before modernization and 4.27 minutes after or almost exactly 50% or half. The table to the right is then depicted in bar graph form with the first bar showing minutes per cow per day before (blue) and the second bar (yellow) after modernization for each of the activities. The graphs show the decrease in labor in a more dramatic, visual manner.

Minutes/ /Cow/Day	Milk Time	Stall Work	Setup Clean	Feed Time	Cow Handling	Manure Handling
Before	4.07	0.80	0.51	1.59	0.75	0.79
After	2.09	0.32	0.32	0.65	0.49	0.40
% Decrease	49%	60%	37%	59%	35%	49%





Mindsets tend to change with modernization of dairy facilities, especially for those going from tie stalls to a parlor and free stalls. The earlier mention of milk production changes of 6-8% is also important on top of the labor savings. An old rule of thumb is that a parlor milking system made sense around the 60 cow herd size mark. There is still some truth to that, but recognition of other activity labor saved, lower cost parlor options, added safety and healthier ergonomics favor the parlors over the tie stall barn.

Is Robotic or an Automatic Milking System (AMS) a Viable Option?

Yes, but not for all. AMS tends to be higher cost per cwt. but the viability and variability lies in the productivity and management of the AMS. Graziers and Organic dairy producers are considering this option so a discussion is warranted. AMS systems have a wide variation of success—highly dependent on the pounds of milk harvested per robot per day and the percent increase in milk production due to the AMS system relative to the alternative system being considered.

The first important point is what is the AMS being compared to? If compared to a Tie Stall Barn, an inefficient parlor or an expensive parlor, the AMS, if harvesting greater than 4,500 pounds of milk per day will probably compare quite well in profitability and cost per cwt. However, if compared to a low cost, highly efficient milking parlor, the parlor would tend to be the better option. If the AMS is harvesting less than 3,500 pounds of milk per day and is being compared to a low cost, highly efficient milking parlor, the AMS would probably have difficulty competing profit-wise. To compare systems, one tool to use is the DIRTI 5 Fixed Cost Analysis which is an acronym for Depreciation, Interest, Repairs, Taxes and Insurance of an asset on an annual basis. Then, variable costs are added to these fixed costs which is ultimately divided by a unit of measurement, or cwts. of milk sold annually in our example. Consider the comparison table below that shows a producer retrofitting two AMS into current facilities

versus a Swing 12 Low Cost Parlor (LCP), even accounting for a 5% increase in milk production for the AMS, resulting in a cost of milking cows at $2.13 per cwt. for the AMS and $1.08 per cwt. for the LCP.

Milk production responses to AMS are highly variable. Iowa surveys have shown a 10% to 17% average increase in milk production for retrofitted housing facilities and new housing facilities, respectively. A 10% increase is often touted but remember when building new housing facilities, a 6-8% increase in milk production is often expected. Incorporating an AMS would give 3-5% added milk production. So, when new housing facilities are coupled with AMS, a 10% combined milk production increase would be expected, but not guaranteed. The Iowa experience is 7% higher milk production than expectation and it can be argued the credit could go to the AMS or the new facilities.

The Case of the TRANS Family and the BURNS Family

This author consulted with two neighboring dairy families. The TRANS family wanted to consult about installing an AMS system to milk their cows. The BURNS family wanted to consult about installing a low cost parlor to milk their cows. In each consultation, various milking system options were laid out with costs, concerns, and cases made for each system. After careful consideration, the TRANS family, who originally thought the AMS route, decided to go the LCP route and are very happy they did so with the comment reported back that they cannot see themselves going the robot route. The BURNS family, who originally thought the LCP route, decided to go the AMS route and are very happy they did so with the comment that robots are the way to go.

DIRTI 5	Retrofit 2 AMS	Retrofit Swing 12 LCP
Depreciation	$400K – $70K = $330K/15yrs = **$22K/yr**	$50K - $5K/20yrs = **$2,250/yr**
Interest	$400K x 5.5% = **$22,000/yr**	$50K x 5.5% = **$2,750/yr**
Repairs	**$16,000/yr** (not incl. teat dip/chems)	**$1,000/yr**
Taxes	no taxes on agricultural equipment in Iowa	
Insurance	$400K x .005 = **$2,000**	**$225**
Sum	**$62K/32,850cwt/yr=$1.88/cwt**	**$6,225/31,207cwt/yr= $0.20/cwt**
Labor &/or other Variable Costs	**1.5/hrs x $15/hr x 365 = $.25/cwt**	**5 hrs. x $15/hr x 365 = $.88/cwt**
Total	**$2.13/cwt** 3,000 - 6,000 lbs milk/robot/day	**$1.08/cwt** 44 – 75 cows/person/hour

The moral of the story from these two cases is that there is much personal preference in choosing a milking system. Cost and labor flexibility need to be weighed carefully with many other management and facility factors that producers are encouraged to discern options with an open mind and focused on long term labor availability and cost along with facility flexibility for possible growth.

Positive Impacts		Negative Impacts	
Increased Incomes		**Increased Expenses**	
Increased Milk Production	$88,865	Capital Recovery Cost of Robots (Dep & Int)	$84,250
Increased Milk Premium/Fat/Protein	$22,544	Increased Repair and Insurance Costs	$24,750
Increased Cull Cow Sales	-$2,754	Increased Feed Costs	$51,665
Software Value to Herd Production	$10,800	Increased Cow Replacement Costs	-$5,508
Total Increased Incomes	$119,455	Increased Utilities and Supplies	$11,956
Decreased Expenses		Increased Records Management	$5,585
Reduced Heat Detection Labor	$2,044	**Total Increased Expenses**	$172,697
Reduced Milking Labor	$44,457	**Decreased Incomes Expected**	
Reduced Labor Management	$8,213	**Total Decreased Incomes**	$0
Total Decreased Expenses	$54,714	**Total Negative Impacts**	**$172,697**
Total Positive Impacts	**$174,169**	**NET ANNUAL FINANCIAL IMPACT =**	**$1,472**
Annual Value to Quality of Life =	**$15,000**	**with Annual Value of Quality of Life =**	**$16,472**

The DIRTI 5 and the Partial Budget Tool

When discerning, consider a partial budget tool as follows that uses the DIRTI 5 tool introduced and utilized in the previous example in addition to variable costs subtracted from various and variable income changes. The beauty of the partial budget tool is simplicity as we only need to look at what changes when comparing one milking system to another, not a whole farm analysis. The spreadsheet below depicts an example of a partial budget for Robotic Milking.

In this example, we see increased incomes such as milk sales, milk premiums, etc. with the AMS compared to the current “semi-efficient” milking system, to the sum of $119,455. With the AMS, expenses like

heat detection, milking labor, etc. would be decreased to the sum of $54,714 in this example for a total of positive impacts of $174,169. For negative impacts by means of increased expenses, the example show $172,697 for a net annual financial impact of $1,472. Thus, showing the profitability of the AMS is very comparable to the current milking system.

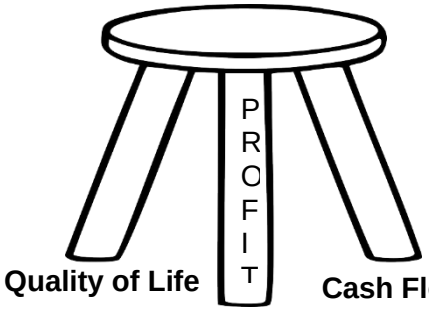
Beyond profitability, one best consider its impact on "quality of life" for the farm and family and the cash flow implications. Consider that decision-making tree as a three legged stool.

Even though the profitability is positive, the quality of life implications have been both positive and negative for producers installing AMS. And, cash flow can be quite negative early on as well to pay the investment back and later on for possible high repair bills. If borrowing most of the money to install AMS, it might be likened to paying for a high percentage of milking labor for next 15 years but needing to pay it back in 7 years, depending on the length of the note. In addition, if previously milking my own cows without paying self for labor and now paying on a robot, the labor now has to be paid with cash. These are just two issues concerning robots that even if they are a good decision profit-wise, cash flow ability might be quite the opposite story. Another great reason to understand the difference between cash flow and profitability.

Milking System Mindset Summary

How much can one spend or want to spend to get their cows milked is a personal preference and decision. The milking system mindset can have as much impact on profitability as does milk production per cow, decisions to graze or not to graze, or even feed purchases per cow in the experience of this author. Selecting a milking system based on "this is how we've always done it" can be very short-sighted as we look at the future of the dairy industry and the labor efficiency it might demand to be a success. The milking system itself can be T-H-E major player of labor efficiency on the farm, especially for tie stall barn producers whereby the feeding, manure handling, cow handling and other activities are wrapped up in the milking system as well.

Realizing the tie stall barn has features important in the past and to family life and personal preference, the animal welfare implications may trump other attributes in the future. Based on current milking system experience, this author recommends a look at all the systems out there in this order:



1) **Low Cost TRANS Iowa Parlor**—with the focus on low cost, it can be as fancy as one wants depending on the budget available. The value over cost ratio is highest for this system. Know this parlor can compete with most others, if designed correctly, in throughput, safety and ergonomics. It can also be adapted to many types of technology, too. Due to its popularity in grazing and organic circles, there is a special chapter on building your own low cost TRANS Iowa parlor towards the end of this book. The goal is to milk 64-80 cows per person per hour.

2) **Rotary Parlor**—for larger herds of 600 cows or more, the rotary parlor should be at least considered IF the goal can be met to milk 100-125 cows per person per hour to compensate for the additional investment balanced by labor availability.

3) **AMS or Robotic System**—for 240 cows or less, this system may be an option for those willing and able to finance the investment and manage the technology. For herds larger, the decision will probably be more related to labor availability.

4) **Medium or High Cost Parallel Parlor**—for herds greater than 300 cows that have the financial ability and/or desire to milk longer shifts for the better part of the day. Higher cow handling and technology levels might be incorporated to better accommodate hired labor.

5) **Flat Barn Parlors**—please know Flat barn parlors are less safe and only slightly better ergonomically than a tie stall barn. These are NOT recommended.

6) **Tie Stall Barns**—due to safety, ergonomics and cost, even if the stall barn is considered free, it is a costly way to milk cows for herds of 50 cows or more.

Know that there are exceptions to every recommendation given that often involve finances or labor available, cultural and religious preference, family life consideration, work ability and ethic, tradition or even lack of desire to change.

Other Labor Efficiency Issues on the Farm

As profit analysis are done on farms and ratios regarding labor efficiency jump out relative to benchmarks, the milking system is usually most pertinent. Other systems that impact labor efficiency are discussed below:

The cow handling system – cows need to be sorted, bred, checked, administered shots and worked by the vet. Producers use a combination of headlocks, palpation rails, crowd gates, head gates, a stanchion, a tie stall or even a dog to help hand cattle. Consider the time it takes to handle your cows for things other than milking. Sometimes small investments in cow handling have fast paybacks on labor and frustration saved. The holding area of the milking parlor is one area where investment is encouraged as it is very important to keep the milker in the pit while milking.

The feed handling system—Dairying is a materials handling business and the highest quantity of material moved is the feed on a daily basis. Consider the time it takes to use a TMR, PMR (if robotic or feeding in parlor), haylage, baleage, silos, bags, bunkers, skid steers, feeder wagons and where the feed is being fed in pasture, at fence line feeders, in big bale feeders, in free stalls or in stall barn. It seems as farms get larger, feeding systems get more streamlined as well. The feed handling system often has room for improvement labor wise but also feed wastage wise as each practice listed has its own inherent wastage and shrinkage levels.

The manure handling system—Manure is another major material handling need on a dairy with nutrient and environmental concerns tied to it. Non-daily haul is a goal as demonstrations have shown that even two weeks of manure storage can lessen manure handling time in half. If grazing, a lofty goal is that during the grazing season, 80% of the manure gets deposited on the pasture. This means cows haul most of their own manure for at least 6 months of the year or 40% of the total manure generated is cow spread. For the other 60%, consider the current handling system versus costs of both more storage and custom handling of the manure.

The Crop Production and Harvest System—Grazing has proven to save significant labor as related to managing and feeding cows. It is a requirement of organic systems, a necessity of the grass milk system and a possible profit avenue for the conventional systems, at least for the raising of heifers. Multiple crop enterprises like alfalfa tend to take more labor than a single crop corn silage or even if double cropped with a cover crop. Custom machine hire versus a “do-it-all yourself” mindset impacts labor efficiency. Larger conventional systems, thanks to custom hire and bigger machinery, have many labor efficient means available to them, of course at a cost

The Calf and Heifer Rearing System—Nurse cows, auto feeders, milk bars, pasteurization, group housing are a list of practices that affect labor efficiency variation, cost of raising calves and relative growth rates and production efficiency later in life. With the high cost of raising heifers relative to their market value, issues like sexed semen, custom raising, genomic testing, using beef semen, bulls versus AI, grazing versus confinement housing are all impactful to the labor used to raise heifers.

A labor efficient mindset is a goal, a focus of profits. It’s pure psychology. If producers focus, day in and day out, about improving milk quality, and are driven to learn and improve upon it, it tends to improve. If producers focus, day in and day out, about improving milk production per cow, and are driven to learn and improve upon it, it

tends improve. If producers focus, day in and day out, about improving labor efficiency, and are driven to learn and improve upon it, it tends to improve. Our focus tends to become our reality. It's a mindset that works well, but it also tends to work the opposite way. If a producer feels their labor is not worth much, that attitude would tend to lead to a labor return value not worth as much either.

Using labor market benchmarks, what is one's labor realistically worth? Why is it that some dairy producers are working for negative returns per labor hour worked? Why is it some dairy producers are working for less than minimum wage? Why is it some dairy producers are working for less than they are paying their employees? Why is it other dairy producers are earning more than they could in an off farm job? Why is it some dairy producers are making much more?

The answer might lie in the simple concept of the power of positive focus regarding value of labor and or time. Positive focus tends to lead to positive definition within ourselves which ultimately leads to positive reality. In this chart of Farm Psychology 101, many means of mental thought on left side impact our core being in middle that lead to positive outcome. Like most things, success is often a mind over matter concept. Make labor efficiency on the dairy farm, a mind over matter concept, starting with the milking system.

The graph below shares many three stage mindsets of getting to the positive reality of actions, behaviors, habits, performance, and decisions. To change the REALITY positively, one might best to understand the feelings, attitudes, values, principles, and identities in people's minds in their DEFINITION of who they are. But, often one needs to step back even further to understand what thoughts, images (pictures), ideas, perception and mission that is their FOCUS. Bottom line is that labor efficiency becomes a mindset that has an end reality, but really stem from people's definition and focus.

Farm Psychology 101:

The POWER of POSITIVE *REALITY*

Thoughts → Feelings → Actions
Images → Attitudes → Behaviors
Ideas → Values → Habits
Perceptions → Principles → Performance
Mission → Identity → Decisions

FOCUS → DEFINITION → *REALITY*

Labor Efficiency Benchmarks

L	DAIRY TRANS Profit Performance Rating	Yours	Goal	%Between	Average	1-100
A	Adjusted Gross Return per FTE **Labor**	$348,000	$314,685	195%	$279,720	100
B	Return to All Labor per FTE **Labor**	$58,209	$45,000	166%	$25,000	100
O	Number of Cows per FTE **Labor**	88	60	375%	50	100
R	ECM/FTE= 17,691 Cwts. of Milk Sold per FTE **Labor**	16,625	10,000	365%	7,500	100
#	All **Labor** Costs per **Cow**	$443	$600	179%	$800	100
	All Labor as a Percent of Total Costs	12%	20%	182%	30%	100

The above Dairy TRANS Labor Efficiency analysis shows good benchmarks for an efficient grazing dairy. The benchmarks vary depending on production system (organic vs conventional) and production practices (custom raising heifers vs raise own) acreage per cow (raise vs purchase feed). But, high levels of labor efficiency can be achieved, generating good returns and low labor costs.

There are many ways to achieve labor efficiency on a dairy and this focus should be highlighted on many dairy farms. Again, not downplaying the importance of feed costs and/or milk production per cow, simply highlighting a need for more attention to labor efficiency due to cost and availability on many farms. The milking system is often a first place to begin investment of time and money when labor efficiency is low, but other areas of the farm, including feeding, housing and manure handling systems can play an important role, too.

So, is an investment in labor efficiency of value to better sell or hire labor, especially for younger producers with the time value of money hopefully working to their advantage? An outside set of eyes analyzing labor efficiency practices might be in order. In sum, focus on labor efficiencies to define a labor efficient realty.

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