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UNIVERSITY OF MINNESOTA DAIRY Initiatives NEWSLETTER

Contents

When it comes to milk production . . .

More is NOT Always Better!

BY JOE CONLIN

As a dairy farmer, your job is to make as much milk as you can, right?

Wrong.

Many producers have it in their minds that they ought to maximize production. However, it's becoming increasingly obvious that high milk output does not necessarily mean high profit or a successful farm. In the long run, money in the bank is more important than milk in the tank.

Manage for Profit, Not Production

Milk production is only one piece of the profit equation. You also have to figure in price and cost. Your challenge as a dairy producer is to juggle all three—production, price, and cost—so that they produce maximum returns.

Take these facts, for instance: In a 1992 survey of 800 Minnesota dairy farms, cash returns from producing milk (the money available for taxes, principal payments, and family living) varied from an average of $4.76 per hundredweight of milk produced for the top 20 percent of farms, to $0.50 per hundredweight for the poorest 20 percent. Not only that, but high-profit farms were paid more per hundredweight for their milk while producing it at a lower cost. In other words, the poorest farms were almost *paying* for the privilege of making milk, while the best-managed farms spent relatively less and were better rewarded for their efforts.

It's pretty obvious from these figures that there is more to making money on a dairy farm than just making milk. You must *make milk intelligently* in order to get a decent rate of return on the money you invest in your operation.

How Does Your Performance Compare?

Various studies show that high-profit farms differ from other farms in several ways. These break down into four main categories: whole farm performance, dairy cost control, production performance, and crop performance. By comparing figures for your farm to those for the best and the worst of Minnesota's dairy farms, you can identify "hot spots" for improving the financial performance of your farm.

Take some time now to figure how your farm compares to the figures listed for "healthy" and "unhealthy" farms below. Then circle the areas in which you stray furthest into the "unhealthy"

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The Magic Number

HOW MUCH MONEY does milk have to bring in in order to make dairy farming economically worthwhile? According to extension dairy management expert Joe Conlin, the answer depends on your long-run cost of production. In a 1992 survey of Minnesota dairy farm business records, the milk price needed to cover the costs of family living, taxes, depreciation, and a reasonable return on the farm investment ranged from $13.22/cwt. for the best 20 percent of farms to $18.00/cwt. for the least profitable. Translation: If you want to turn a profit, you have to keep production costs in line.

More is NOT Always Better!

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realm. These are your target areas for improvement. If you work to bring these up to par, you will find yourself rewarded with a better, more profitable dairy operation.

Whole Farm Performance. These are standard measures of the profitability, liquidity, and solvency of a business. They are based on the whole farm.

Rate of return on farm equity (RFE) and *operating profit margin* are measures of profitability. You can calculate these measures for your own farm as follows:

To calculate RFE, subtract gross farm expenses and the value of unpaid family and operator labor and management from gross farm revenues (income), then divide the answer by the total equity you have in your farm.

To calculate operating profit margin, subtract gross farm expenses and the value of unpaid family and operator labor and management from gross farm revenues (income), add in the farm interest you pay, divide the answer by your gross revenue (income), then multiply by 100 percent.

Percent equity, a measure of the farm's solvency, tells what portion of the farm assets are owned. High-profit farms tend to carry less debt than low-profit farms.

The *cash flow coverage ratio*, a measure of liquidity, lets us know if the farm is generating enough cash to pay the bills on time. To calculate this performance measure, divide your gross farm revenue (income) by the sum of your farm and family expenses, debt obligations, and taxes.

Percent gross expenses of gross income tells what portion of the income goes to meet cash expenses. The remainder is available for family living, capital improvements, paying debt, taxes, and savings. A high number here suggests a need for firmer cost control.

Performance Measure	*Unhealthy*	*Healthy*	*My Farm*
Return on farm equity invested	**<5%**	**>15%**	
Operating profit margin	**<5%**	**>18%**	
Percent equity	**<40%**	**>60%**	
Cash flow coverage ratio	**<107%**	**>120%**	
% gross expenses of gross income	**>90%**	**<65%**	

Note: In this and the following tables, "<" denotes "less than" and ">" denotes "greater than."

Dairy Cost Control Guidelines. Farm-to-farm differences in the cost of producing milk are large. Most of these differences are due to cost control—buying only what you need, controlling waste, using preventive management. As you compare your figures with the "healthy" and "unhealthy" farms, pay special attention to feed costs. Because they account for more than half of the cash costs of producing milk, it is critical that you keep these costs under control.

Performance Measure (*all dairy cows & replacements*)	*Unhealthy*	*Healthy*	*My Farm*
Cash cost/cwt. to produce milk	**>$12.00**	**<$9.50**	
Feed cost per cwt.	**>$6.00**	**<$5.00**	
Cost of dairy supplies/cow/year	**>$90.00**	**<$60.00**	
Electric utilities/cow/year	**>$80.00**	**<$60.00**	
Dairy repair costs/cow/year	**>$90.00**	**<$60.00**	
$ margin per cwt available for family living, debt pay, and taxes	**<$2.00**	**>$4.00**	
Value of farm assets per cow	**>$7,000.00**	**<$5,000.00**	
Debt per cow	**>$3,000.00**	**<$2,000.00**	

Production Performance. Each of the production performance measures shown below has a major effect on the cost of producing milk. For example, skillful management to achieve good reproductive performance improves the profit margin because cows spend less time in the low-production tail end of their lactations.

Performance Measure	*Unhealthy*	*Healthy*	*My Farm*
Milk produced (lb/cow/year)	**<17,000**	**>19,000**	
Somatic cell count (SCC)	**>400,000**	**<200,000**	
Age at first calving (months)	**>27**	**<25**	
Calf death loss	**>12%**	**<5%**	
Average days open	**>125 days**	**<115 days**	
Average PTA $ of service sires	**<$200**	**>$275**	
% barn capacity in use	**<90%**	**>100%**	

Crop Performance. Most Minnesota dairy farms raise crops. However, crop production costs can easily get out of hand because of a lack of *scale efficiency*—the value of the crops harvested on some farms is not enough to make the

investment and repair cost of field machinery worthwhile. Ways in which some farmers are controlling these cropping costs are to rely more on custom work, share expensive machinery, or even eliminate grain crops that require large investments in machinery.

Performance Measure	*Unhealthy*	*Healthy*	*My Farm*
Machinery investment per acre	**>$450.00**	**<$300.00**	
Repair cost per acre	**>$40.00**	**<$25.00**	

Signs of Success

COMPARED TO LESS PROFITABLE FARMS, MINNESOTA'S BEST DAIRY OPERATIONS . . .

. . . produce more milk per cow

. . . have lower calf death losses

. . . have higher cow turnover rates

. . . use more of their barn capacity

. . . have more cows

. . . have higher levels of grain feeding

. . . produce more milk per worker

. . . have more cows per worker

. . . get a higher price for their milk

. . . have a lower feed cost per hundredweight of milk produced

. . . have lower debt per cow

. . . have a higher cost per cow but a lower cost per milk output for health/veterinary, breeding, utilities, repairs, custom work, and hired labor

. . . have a lower per-acre labor and machine cost

. . . have lower fixed overhead costs per hundredweight

. . . have a lower farm investment cost per cow

Capitol Update

The 1993 session of the Minnesota Legislature brought some good news for dairy producers. With the strong support of the Minnesota Dairy Leaders Roundtable, a blue-ribbon coalition formed at the outset of the Dairy Initiatives program, the legislature took the following action:

Improved the Premium Payment Program (Component Pricing). The legislature expanded the kinds of characteristics on which milk prices may be based. Now milk may be priced according to percent milk fat, pounds of milk fat, pounds of protein, pounds of solids not fat, or other criteria. Prices also may be adjusted to reflect milk quality and other premiums.

Changed the Rural Finance Authority. Several changes were made in the Rural Finance Authority. New laws raised the cap on agricultural improvement loans, increased the involvement of local lenders, expanded the loan program to allow borrowers to take out more than one loan, modified the loan restructuring program, and allowed for loans for developing ethanol facilities.

Provided for the Minnesota Dairy Partnership. The legislature gave the commissioner of agriculture authority to provide up to $100,000 per year to the Minnesota Dairy Partnership. The partnership, made up of leaders in the dairy industry, was established last year by the Dairy Leaders Roundtable to promote the revitalization of dairying in Minnesota.

In addition to these bills, the legislature also took the following actions that affect Minnesota dairy producers:

- Passed a bill to replace the milk price law that had been passed in 1992 and then disabled by court challenges. The new law puts a 2.5¢ assessment on Class 1 milk for each 1¢ the price is below $13.20. It also reduces the required retail markup on milk.
- Made changes in classification rates for agricultural property that are expected to save Minnesota farmers $40 million in property taxes.
- Made changes in pesticide handling requirements.

"We feel that the 1993 legislative session was a great start in showing what positive things can be accomplished when the dairy industry works together," said Allen Gerber, executive director of the Minnesota Association of Cooperatives and the legislative contact for the Dairy Leaders Roundtable. "We look forward to making further progress as we continue to encourage legislation that helps Minnesota's dairy industry."

Don Breneman

Seitzer Farm Focuses on Profitability

FARM FACTS: Brothers Peter and David Seitzer and their families are fourth-generation operators of an 800-acre dairy farm near St. Peter, Minn. The Seitzers milk 62 cows with an average production of 22,500 pounds per year, and grow corn, soybeans, and alfalfa. They feed a single TMR ration to all animals, and are able to keep total feed costs below $4 per hundredweight.

The Seitzer farm became a Dairy Initiatives demonstration farm in June 1992. Since that time, the brothers have followed a number of recommendations to improve their farm operation and profitability.

QUOTE: "We're not stuck in the mud. We want to make changes to improve our quality of life."

SMART MOVES: Before they joined the demonstration farm program, the Seitzers were raising steers and housed dry cows and heifers together. At the recommendation of the demonstration farm core team, they sold off their steers and moved the dry cows to the empty facilities. This allowed them to feed the dry cows a separate, more appropriate ration and so keep them in better condition.

The Seitzers also have been working with extension agricultural engineer John Chastain to improve ventilation on their farm. In past years, the brothers had trouble with production losses and big drops in feed intake in hot weather. By adding properly sized fans and cutting vents in their barn, they drastically improved the situation. The brothers also cut slots for natural ventilation in their heifer freestall barn. The payoff? Fewer health problems because the improved winter ventilation reduced steam and moisture condensation problems.

Other changes the Seitzers have made include installing an automatic shut-off on their milking system to reduce problems with overmilking and buying a used no-till drill in collaboration with a neighbor to reduce the time, labor, and machinery cost of planting soybeans. They figure that the no-till system saves them four trips over the field, and point out that it also allows them to let corn dry down longer.

PLANS FOR THE FUTURE: The Seitzers are working on several areas of improvement. For one, they are working to build up their soils. They also are trying to reduce problems they have been having with twisted stomachs in heifers. As owners of a registered herd, they also are looking at ways to capitalize on the potential for selling youngstock. Their veterinarian recently became qualified to do embryo transfers, so they expect to incorporate more of that technique into their breeding program.

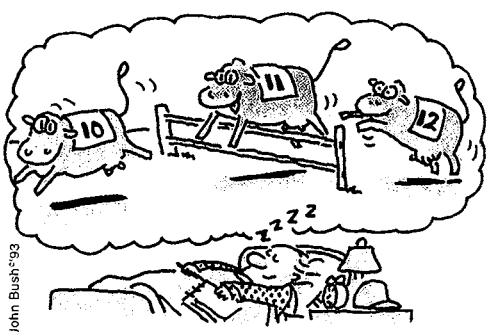
ADVICE: "Keep feed costs low and try to be as profitable as possible. Keep an open mind. Be willing to change—the industry is changing."

Feed Strategies for the Winter of '94

Low-quality hay? Corn silage coming out your ears? You can still make good milk if you balance correctly

If you're like most dairy producers, the cool, wet summer of '93 left you with an unusual mix of feeds in your barns and silos. Your hay may have grown great, but poor harvesting weather probably reduced the quality. And if your corn didn't have time to mature before harvest, you may be long on corn silage and short on grain.

The question now is, how do you turn this hodge-podge into a balanced meal for your cows? Extension dairy nutritionist Jim Linn offers a four-step process that you can follow to keep your herd's nutrition top-notch while minimizing purchased feed costs.



John Bush '93

STEP 1: Count Your Cows. As the Feed Inventory Worksheet (right) shows, you first need to figure out your number of "animal units." This number lets you take into account the lower requirements of youngstock when figuring your needs. Divide the number of calves by 4 and the number of yearlings by 2 and add to the number of milk cows in your herd to find your total.

STEP 2: Figure Out What You Would Like to Feed. Now fill in what you'd like to feed each cow in the second part of the worksheet. Some change from your usual feeding program may be needed. For instance, if your hay supply is low or poor quality, but you will have plenty of corn silage, it makes sense to set up your ration so it's heavy on the silage.

Table 1 shows the amount of corn silage, alfalfa haylage, shelled corn, and soybean meal to feed based on various ratios of corn silage to alfalfa haylage. You can use this table to help fill in your estimates for Part II of the worksheet. *Continued on page 4*

FEED INVENTORY WORKSHEET (for your use)

I. Cattle Inventory

Number of milk cows:	**Number of yearlings divided by 2:**
Number of calves divided by 4:	**Total number of animal units:**

II. Feed Needs

	lb/day x days	*= lb/ animal unit*	*tons[a]/ animal unit x animal units*	*= tons needed*
Hay				
Hay silage				
Silage				
Grain				

III. Feed Resources

A. Forage	*bales x*	*lb/bale*	*= lbs*	*tons[a]*
Hay (1st crop)				
Hay (2nd crop)				
	silo size	*depth settled silage*	*= tons*	*correction factor* / *tons[a]*
Silage (corn)				
Silage				
Silage				
B. Grain	*bushels x*	*lb/bu*	*= lbs*	*tons[a]*
Oats		**32**		
Ear corn		**70**		
Shelled corn		**56**		
Barley		**48**		

IV. Summary

	hay	*silage*	*silage*	*grain*	*grain*
Amount needed (tons)					
Amount available (tons)					
Shortage (tons)					
Excess (tons)					

[a] Tons = lbs ÷ 2,000

Table 1. ESTIMATED YEARLY (365 DAYS) FEED NEEDS OF A LACTATING COW.

Average milk lb/day		Average as fed lb forage/day				
	Corn silage	84	60	40	20	0
	Alf haylage	0	16	27	37	45
50 lb milk @ 3.5% fat		*tons/year*[1]				
Corn silage @ 35% DM		19.0	13.0	8.5	4.5	0
Alfalfa haylage @ 50% DM		0	4.5	7.0	9.0	9.7
Corn, shelled		0.5	1.1	1.5	2.5	3.5
Soybean meal		1.5	0.7	0.3	0	0
60 lb milk @ 3.5% fat						
Corn silage @ 35% DM		19.0	13.0	8.5	4.5	0
Alfalfa haylage @ 50% DM		0	4.3	6.5	8.7	10.3
Corn, shelled		0.6	1.5	2.2	3.0	4.0
Soybean meal		1.7	1.0	0.7	0.3	0
70 lb milk @ 3.5% fat						
Corn silage @ 35% DM		18.0	13.0	8.5	4.5	0
Alfalfa haylage @ 50% DM		0	3.0	5.5	7.7	10.0
Corn, shelled		1.3	2.2	3.0	3.9	4.8
Soybean meal		2.0	1.6	1.2	0.8	0.4
80 lb milk @ 3.5% fat						
Corn silage @ 35% DM		17.0	13.0	8.5	4.5	0
Alfalfa haylage @ 50% DM		0	2.2	4.5	6.8	9.2
Corn, shelled		2.2	2.9	3.8	4.6	5.4
Soybean meal		2.3	2.0	1.7	1.2	0.8

[1] *Amounts include a 15% storage and feeding loss.*

Planning to Buy Hay?

IF SO, YOU MAY WANT to do a few quick calculations first. According to extension dairy nutritionist Jim Linn, you could save money by using immature corn silage instead.

"If good hay costs a dollar or more per point of RFV, immature corn silage may be a less expensive alternative this year," Linn says.

To figure out your best value, work with your feed consultant on some least-cost ration balancing. In some example rations Linn has run, immature corn silage figures to be a good buy at $18 to $20 per ton compared to paying a dollar per point of RFV for high-quality hay.

If you do decide to purchase hay, Linn offers this warning: figure out your forage needs for the year and buy what you need now. That way you'll avoid paying more next spring, when increased end-of-season demand nudges the price up.

STEP 3. Find Out What You Have. Now you need to find out what you have available. Go through your inventory and list on paper how many pounds, tons, bushels you have of your various feeds. As part of this process, tests on all forages and home-grown grains to evaluate quality will be beneficial.

STEP 4. Create a Balanced Ration. Now you know what you have and what the quality is. Compare this with what you need. You may have more of a feed component than you need for your herd, or you may have less of something (most likely high-quality forage) than you need to balance the diets.

If you will be short of forage, consider adopting one or more of these options:

- cut your herd size
- buy hay
- make or buy additional corn silage to meet your forage needs
- option out your heifers

If you have adequate forage but quality is low, you will need extra energy in the ration. Here are some situations and options to consider:

If you have plenty of corn silage but not much hay: Substitute corn silage for hay or haylage. All-corn-silage rations have been fed with good success. If corn silage will be more than half of the forage DM in your ration, be sure to feed a buffer. Buffers also should be fed when the ration is above 40 percent moisture.

Don't Cut Salt!

If you buffer your feed with sodium bicarbonate, that doesn't mean you should cut back on salt, warns extension dairy nutritionist Jim Linn. Linn has seen serious production losses caused by insufficient salt in just such instances. Linn's salt recommendations? One ounce maintainence level per cow plus an ounce for every 30 pounds of milk she produces—whether you buffer or not.

If your corn tests high in fiber and low in starch: Substitute high energy byproduct feeds into the rations. Some feeds to consider are soyhulls, wheat midds, or cottonseed. These feeds add digestible fiber as well as energy. However, don't forget about corn as a good source of starch.

If you are looking for a low-cost degradable protein source: If you didn't add NPN to the silage at filling, urea can be mixed in to the ration at feeding time. Maximum daily amounts of urea to feed are as follows:

animal	*urea (lb/day maximum)*
lactating cows	0.4
dry cows	0.25
bred heifers	0.25
heifers 6-13 mo.	0.2
younger heifers	not recommended

To get maximum benefit from NPN, be sure to check sulfur levels in the rations. A minimum of 0.2 percent of ration dry matter is recommended.

If you need more energy in your diets: Add supplemental fat up to a limit of 7 percent of DM or 3 lb/cow/day as follows:

In a diet high in fiber and low in forage quality: animal fat, soybeans sunflowers, distillers grains, rumen inert fat

In a diet low in fiber and high in corn silage: fuzzy cottonseed, animal fat, rumen inert fat

If corn and soybean meal prices skyrocket: You can substitute other sources of energy and protein for some of the pricey feed. To make sure you don't end up spending just as much—or more—for the feed value in substitutes, compare the feed price with the breakeven prices shown in Table 2.

Table 2. BREAKEVEN PRICES FOR VARIOUS FEEDS WHEN SHELLED CORN AND SOYBEAN MEAL (44%) PRICES CHANGE.[1]

Corn price ($/bu)	2.00	2.25	2.25	2.50
Soybean price ($/ton)	170	225	250	250
Energy feeds[2]		*$/ton*		
Barley	63	69	67	76
Beet pulp	60	65	64	73
Brewers grains, wet	30	39	43	43
Corn gluten feed, dry	98	118	125	131
Cottonseed, fuzzy	115	137	143	152
Malt sprouts	107	133	142	147
Oats	53	56	53	62
Soy hulls	63	69	68	77
Wheat	59	60	55	65
Wheat midds	80	89	89	97
Protein feeds[3]				
Blood meal	495	700	803	780
Canola meal	127	163	179	180
Distillers grains	172	217	236	238
Linseed meal	146	190	209	210
Meat & bone meal	462	590	655	642
Soybean meal, exp.	263	355	399	394
Soybeans, raw	153	179	190	191
Soybeans, heated	251	316	347	343
Sunflower meal	95	120	130	132

[1] Source: University of Wisconsin Feed Val computer program. Opportunity prices only indicate value of nutrients in a feed compared to the reference feed nutrient values. They provide no indication of how much can be fed or whether or not a ration is balanced by including a good feed buy in the ration.

[2] Energy feed prices based on: CP, TDN, Ca and P in corn, soybean meal, dical ($340/ton) and limestone ($80/ton).

[3] Protein feed prices based on bypass protein (UIP), TDN, fat (tallow @ $440/ton), Ca and P content of feeds.

If you have low test-weight corn: Don't worry—the feed value for the most part is still there. However, when balancing rations you will need to figure an actual TDN, which is lower than what the tests show. To estimate TDN (dry matter basis) of low test-weight corn, use the following formula:

TDN (corrected) = 88 - [54 - test weight]
82 = 88 - [54 - 48]

For example, 48 pound test weight corn will have a TDN of 82 percent.

Steuernagel Joins DIN

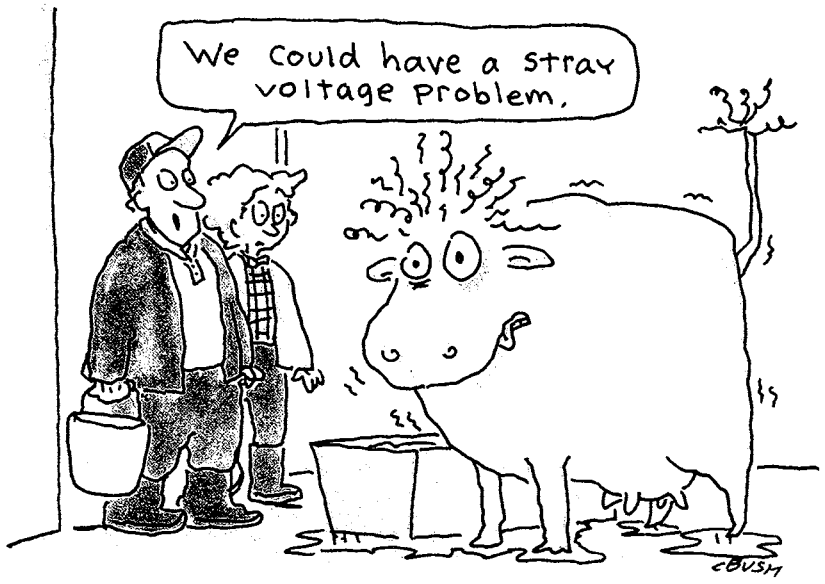
Don Breneman

EXTENSION animal science specialist Jerry Steuernagel has been named editor of the Dairy Initiatives Newsletter following the retirement of founding editor Gil Ward.

A lifelong Minnesota resident, Steuernagel grew up on a 600-acre dairy farm near Stillwater. He received a Ph.D. in animal science from the University of Minnesota in 1979 and has been working as an extension specialist with emphasis in the area of processing of DHI records for the past 23 years.

"I am pleased to be able to make this contribution to Dairy Initiatives' effort to revitalize Minnesota dairying," Steuernagel says. "My goal for the newsletter is that it continue to help producers make their family dairy farms both enjoyable and profitable."

Stray Voltage and Electrical Safety Problems Go Hand in Hand



John Bush©'93

BY JOHN CHASTAIN

What is Stray Voltage?

Stray voltage is a small voltage difference between two animal contact points. In dairy barns, this often is called a *cow-contact point.* A common example is a small voltage difference between the water cup and the floor of a dairy barn. When the animal touches both surfaces, completing the electrical circuit, a small current flows through its body.

Elevated voltages across cow-contact points are called "stray" because they are not present under normal conditions. When voltages across cow-contact points are significant, production losses can be substantial.

Fortunately, most Minnesota dairy farms do not have stray voltage problems. When stray voltage problems do occur, the sources can be found and corrected by thorough investigation using proper equipment.

Symptoms of Stray Voltage

Production losses occur when animals alter their behavior because of the small shocks or tingles associated with high cow-contact voltages. These voltages are not large enough to harm the animal. If dangerous levels of voltage are present, then a safety problem exists and should be corrected immediately by a licensed electrician.

Some changes in animal behavior caused by stray voltage are: 1) cows are excessively nervous during milking (dancing around in the stall); 2) cows are reluctant to enter the parlor or stall; 3) cows are reluctant to use waterers or to consume feed; and 4) poor milk letdown. Remember, though, that these changes also can be due to problems with milking equipment, changes in milking routine, feed spoilage, or pollution of drinking water. Therefore, all potential sources of behavioral changes should be investigated.

For more detailed information on the effects of stray voltage on dairy cows, ask your county extension educator for a copy of *Stray Voltage Problems with Dairy Cows (AG-BU-1359).*

What Causes Stray Voltage?

Stray voltage can be from on-farm and off-farm sources.

Off-farm sources of stray voltage can be related to primary neutral-to-earth voltages. These can be dealt with you by your electric utility.

Common on-farm sources of stray voltage on dairy farms are worn insulation on wiring, loose wiring connections, improper use of equipment grounds, electrical shorts, unbalanced 120-volt loads, and improper installation of electric fences or cow trainers. All of these sources of stray voltage can be corrected. Finding and correcting sources of stray voltage requires a complete investigation by qualified professionals using proper equipment.

Many on-farm sources of stray voltage are related to improper wiring of livestock buildings. Because livestock buildings are dusty and damp, electrical connections and insulation deteriorate much faster here than in other buildings. The *National Electric Code (Article 547)* lists special requirements for wiring in livestock buildings. These requirements apply to all livestock barns and milking centers. If you strictly follow these requirements, then your building is "up to code" and the potential for stray voltage is greatly reduced. However, many dairy barns have not been wired according to the electric code, and the special requirements for livestock buildings have not been followed.

The special requirements for wiring of livestock buildings based on the 1990 *National Electric Code* are explained in detail in the *Farm*

Buildings Wiring Handbook (MWPS-28, $10.65). The handbook also provides detailed information on stray voltage and on how correcting farm wiring can help solve stray voltage problems. You may obtain a copy by writing to the University of Minnesota Department of Agricultural Engineering, attn: Ms. Wendy Yates, 1390 Eckles Ave., St. Paul, MN 55108. Enclose a check for $10.65 made out to the University of Minnesota.

Share this information with any licensed electrician who installs new equipment on your farm or alters any wiring. Be sure to specifiy that you want all work to be done in accordance with Article 547 of the *National Electric Code.* In addition, be sure that all electrical work is properly inspected *as required by state law.*

Improper Grounding is a Safety Problem

Proper use of grounding wires on electrical equipment is required in all buildings. However, this is a common oversight on many farms. Improper grounding not only is a cause of stray voltage, it also is a safety hazard. As long as all electrical equipment is in good condition, an improperly grounded system will work. *However, if a motor or heating element fails, then a person or an animal could receive a fatal shock due to improper grounding of the system.* Such a condition is not a stray voltage problem (even though it can cause stray voltage), but it is a safety problem. it should be corrected immediately. If you routinely feel shocks while operating electrical equpment or when you touch metal in any type of livestock building, then you may have a grounding problem.

If You Suspect a Stray Voltage or Safety Problem

If you suspect you have stray voltage problem, begin the problem-solving process by taking ALL of the following actions. DO NOT DELAY!

- Contact your electric utility and explain your concern. Your electric utility can provide a complete stray voltage investigation.
- Obtain copies of *Stray Voltage Problems with Dairy Cows (AG-BU-1359)* and *Farm Buildings Wiring Handbook (MWPS-28)* from the sources listed above.
- Have a licensed electrician inspect the wiring on your farm. Go over the information in the *Farm Buildings Wiring Handbook* with him or her. The handbook can be used as a guide for the special requirements of livestock buildings.
- Make all needed wiring corrections. Remember that the safety concerns related to some wiring problems are more important than the stray voltage problem. You may solve most or all of a stray voltage problem by correcting safety hazards.
- Have your milking equipment dealer check your milking system if it has not been done recently.
- Ask your veterinarian to help you address any herd health concerns that may or may not be related to stray voltage.

It may be necessary for electric utility personnel to install an isolating device to reduce stray voltage on your farm. However, be sure any electrical safety hazards also are corrected. The complex electrical systems of dairy facilities sometimes need special attention to provde a safe and productive environment for the cows and the operators.

If you suspect you have a grounding problem, have a licensed electrician inspect the wiring on your farm to make sure it meets all requirements for livestock buildings. Use the *Farm Buildings Wiring Handbook (MWPS-28)* as a guide. Make all necessary wiring corrections.

Plan Ahead

IF YOU ARE CONSTRUCTING NEW facilities, it makes sense to think ahead and take measures to prevent stray voltage and safety problems.

To prevent stray voltage and safety problems in new facilities, make sure that all new livestock buildings and milking centers are wired according to the special requirements given in the *National Electric Code (Article 547).*

Have the wiring properly inspected. Some insurance companies require that all wiring meet code specifications for livestock buildings. Others may reduce your premiums if you meet code requirements.

In new milking parlors, installation of an equipotential plane and voltage ramp is highly recommended. An equipotential plane is created when the reinforcing steel in the concrete floor is electrically bonded to *all* metal equipment in the milking parlor. The complete system is grounded at the service entrance panel.

A properly installed equipotential plane will maintain all floor surfaces and equipment in the parlor at the same voltage. As a result, no voltage difference can occur across cow-contact points. A properly installed equipotential plane will provide the greatest insurance against future stray voltage problems in milking parlors. Specifications for installing an equipotential plane and voltage ramp are given in the *Farm Buildings Wiring Handbook* (see main article).

Twenty Tips for Safer Farming

Pass it on.

When teaching your kids or other new workers the basics of dairy farming, don't forget to pass along a safety lesson, too. Pay special attention to animal-handling hazards, and talk about specific animals that you know are a problem. Children in particular tend to believe that nothing can harm them. Unless you temper that attitude with a few well-taught lessons, something very well may.

Fresh air, wide open spaces . . . farming has a well-deserved reputation as a wholesome, down-to-earth way of life. What many forget, however, is that it also is one of the most hazardous occupations in the United States. Each year in Minnesota alone, hundreds of people are injured or killed in tragic farm accidents.

Presumably, you are interested in keeping yourself and your family members from becoming part of such statistics. To help you out, extension safety specialist John Shutske offers the following twenty tips to safer dairy farming:

1. Keep it clean. Your animals can literally make you sick if they are infected with diseases such as leptospirosis, rabies, or ringworm. Use a splash guard or eye protection and gloves in an elevated milking parlor to avoid contact with urine. Wash yourself and contaminated sites and properly dispose of infected tissues and dead animals when working with disease situations.

2. Protect your lungs. Injury from dust is among the most common hazards for livestock handlers. Be sure to wear a dust respirator when handling moldy forage material or working in dusty settings.

3. Store it right. Keep pesticides and other poisons out of reach of children and animals. Make sure that flammable or explosive materials are away from sources of fire. Keep tools and equipment where they belong.

4. Know when your cows might be on edge. Cows are more likely to harm a handler when they have a new calf or when they are suddenly exposed to noise or crowds. Be particularly wary in these situations, and let your cow stay as close as possible to her new calf. Dry cows are more likely to be aggressive when they first come in from the pasture, so handle them cautiously for a week or so.

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5. Wear the right stuff. Steel-toe shoes, safety glasses, gloves, long pants, and bump hats are among the basics that can go a long way toward protecting you from the hazards that lurk around you. And earplugs worn in noisy situations will improve the odds that you will be able to hear your grandchildren's laughter someday.

6. Watch your mood. How you feel can affect how safe you are, too. If you are angry, discouraged, tired, or under a lot of stress, you are a walking accident. Postpone animal handling and other high-risk activities until you're feeling better.

7. Lock the switch. To avoid becoming entangled, padlock power switches in the "off" position on electrical equipment such as feed augers before you try to repair them.

8. Think when you approach animals. Cows tend to kick forward and to the side, so be especially wary of hooves in that zone. Because a cow can't see

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directly behind her, you'll be less likely to startle her into kicking or shoving if you approach from the front or side. Also, a cow in pain tend to kick in a way that protects the hurting side. If a cow is injured or has mastitis on her left, approach from the right instead.

9. Give pesticides the respect they deserve. Pesticides can poison you or cause serious skin problems. Read and

follow label instructions. Use a respirator, eye goggles, hard shell hat, rubber gloves, long pants, a long-sleeved shirt and other protective gear required by the label when working with these chemicals.

10. Watch your back. Use a hip lifter and a second person when you help a downed cow. People with back problems can tell you it's worth whatever it takes to avoid injuring yours.

11. Never consider a dairy bull safe. The most placid bull can turn unexpectedly and injure or kill a nearby person. Even if you raised him from a calf, consider a bull potentially deadly and treat him as such. If possible, arrange your facilities so that you never need to come in direct contact with the bull for feeding or breeding.

12. Use restraining devices. Use anti-kicking devices on cows that tend to kick. Use a rope halter, squeeze chute, and headgate for hoof-trimming, breeding, giving medicine, and other such activities. Use a tail-holder to prevent eye injury when examining a cow. Sure, these things cost time and money—but so does a visit to the hospital.

13. Dehorn all cows. Cows with horns tend to be more likely to attack handlers.

14. Keep forage and grain dry. Moisture encourages growth of mold that can enter your lungs and cause permanent damage, even kill you. Burn moldy grain or hay to kill the mold, and air out your hay mow and granary to reduce the hazard.

15. Don't enter a newly filled silo. Deadly levels of nitrogen oxide (NO_2) may be present in a silo for up to three weeks after filling. Do not enter the silo during this period! When you are able to enter, run the filler blower for at least 30 minutes, open the doors down to the level of the silage, and run the blower for another 30 minutes before entering. Keep the blower running while you are in the silo.

16. Beware of manure pit gases. Manure pit gases can poison, suffocate, or explode. Provide appropriate ventilation when you agitate the waste. Don't allow any source of fire near the pit. DO NOT enter the pit without special breathing apparatus, an air tank, a lifeline, and full knowledge of what you are doing!

17. Keep electricity and water apart. Make sure that fuse boxes, switches, and electrical outlets in wet areas are moisture-proof. Use GFCIs (ground fault circuit interrupters) to reduce the risk of shock.

18. Watch grain-bin air. High-moisture grain produces carbon dioxide (CO_2), which can displace oxygen and so pose a suffocation hazard. Open all side doors and manhole covers and use forced ventilation to restore fresh air before you enter a grain bin.

19. Don't go it alone. Whenever you face a potentially hazardous situation—entering a manure pit or handling a quirky animal, for instance—be sure to have someone along who can summon help if necessary.

20. Use it right. Even the safest device can become a hazard if used improperly. Keep all equipment in good running order. Use machinery and tools only for the purpose for which they are intended.

Hardware Helpers

IT'S IMPORTANT TO PUT SAFETY FIRST when designing and building facilities around your farm. Some essentials:

MANGATES. These are small passages between posts placed about 14 inches apart that allow you to escape an animal pen without having to climb a fence or get through the gate. If an animal decides to turn on you, a mangate could save your life.

ROUGH FLOORS. A roughened surface on concrete ramps and floors can prevent bone-shattering falls for both you and your livestock.

TREATMENT STALL. A treatment stall is a must to protect you and your veterinarian during examinations and treatments.

LAGOON FENCE. If you have a lagoon, surround it with a fence and locked gate at least five feet tall to protect children and animals from drowning.

GROUND FAULT CIRCUIT INTERRUPTERS. Wire equipment such as stock water heaters and power tools with a GFCI to reduce the risk of electric shock.

ELECTRIC FENCE CONTROLLERS. This is not a place for make-it-yourselfers! Use only manufactured controllers that have been approved by Underwriter's Laboratory or another reliable testing agency.

MANURE PIT VENTILATION. If you have a manure pit, be sure your ventilation system is properly designed and includes an alarm to alert you to failure.

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