ARIZONA AND NEW MEXICO DAIRY NEWSLETTER

COOPERATIVE EXTENSION
The University of Arizona
New Mexico State University

DECEMBER, 2002

The Dollars and Sense of Cow Culling

Coolidge, Arizona
January 31, 2003
(details inside)

Southwest Nutrition and Management Conference

February 20-21, 2003
Phoenix, Arizona
(details inside)

This month's article:

"New Discoveries-Dirty Electrical Power Affects Cows"

By Donald Hillman, Dave Stetzer, Martin Graham, Charles L. Goeke, Kurt Mathson, Harold H. VanHorn, and Charles J. Wilcox
(see inside)

Next Month:

Meet the new New Mexico Dairy Extension Specialist

New Mexico State University Extension Dairy Website: http://www/nmsu.edu/~dairy

The following videos are available for checkout from New Mexico State University. To obtain a video call Kathy Bustos, (505) 646-3326 or kbustos@nmsu.edu and the video will be sent in the mail, pending availability. There is only one copy of each video available, so we request that videos be returned within two weeks. Note that four of the videos contain an English and Spanish version.

1. The Milking School. Utah State University. Spanish and English. 30 minutes
2. Fitting and Showing Your Dairy Animal....A Winning Experience. Department of Dairy Science, University of Wisconsin. 20 minutes
3. Proper Milking Procedure. University of Florida. Spanish and English. 12 minutes
4. Milking Machine Maintenance. University of Florida. Spanish and English. 16 minutes
5. The Basics of Vacuum and Milking Systems. DHIA Services, 1991. 53 minutes
6. Understanding Dairy Cattle Behavior to Improve Handling and Production. Livestock Conservation Institute, 1992
7. Managing Milking/Ordenar Lecheria. Spanish and English. 1999. 33 minutes
8. Get Milk! Joining A Dairy Crew. University of New Hampshire, 1999. 45 minutes

Need to Calculate Production Costs?

University of Wisconsin dairy farm management specialist, Gary Frank, has developed a Excel spreadsheet to calculate variable cost of production and total cost of production. To access the spreadsheet, go to http://www.wisc.edu/dairy-profit, click on Decision Making Tools, then go to costcwt.xls.

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New Discoveries -- Dirty Electrical Power Affects Cows

Condensed from "Relationship of Electric Power Quality to Milk Production of Dairy Herds," in Press

By Donald Hillman, Dave Stetzer. Martin Graham, Charles L. Goeke, Kurt Mathson, Harold H. VanHorn, and Charles J. Wilcox

Published by: Shocking News, 750 Berkshire Lane, East Lansing, MI 48823 -- donag1@aol.com **9/11/02**

SUMMARY: Complaints that electricity was affecting behavior, health, and milk production of dairy cows when voltages were less than Public Utility Commission (PUC) standards were investigated on 12 farms located in Wisconsin, Michigan, and Minnesota. PUCs and utilities in some jurisdictions have adopted 0.5 volt or 1.0 milliampere at cow contact as actionable limits below which utilities would not respond to farmer complaints of stray voltage. Using power quality instruments common in the electrical industry, investigators found large numbers of transient electrical impulses, and higher than 60 Hertz frequency harmonics on power lines and in milking stalls. Milk production decreased as the number of transient events increased and as the sum of step potential voltages > 0.01 Volt (peak to peak) increased. Leg movements (steps) of the cow increased/minute as voltage differentials increased. Milk production decreased as the number of 3rd, 5th, 7th, 21st and 42nd harmonics increased in a multiple herd analysis. Transient voltages/currents were distorted, nonsinusoidal, impulses at various frequencies produced by nonlinear loads both on and off the farm. Nonlinear loads are produced by electronic devices used in computers, printers, variable speed drive motors, switching on and off, capacitor switching of lines to balance loads, trees brushing power lines, and faults on circuits.

INTRODUCTION

Uncontrolled electric current injected into the earth, commonly called "Stray Voltage" neutral-to-earth voltage (NEV), neutral-to-ground voltage (N-G), or tingle voltage has been the subject of controversy between dairy farmers, some swine and dog kennel operators, and electric utilities in North America since 1970. An Agricultural Engineer in the State of Washington found electrical currents on domestic water systems from primary neutral down-grounds, Jersey cows decreased in milk production, and cattle reduced water consumption when exposed to similar voltages on watering troughs [7,8].

Farmers have claimed that small electrical shocks from the electrical system adversely affect the behavior, health, reproduction, and decrease milk production of dairy cows. The problems stopped or were reduced when the sources of the shocks were mitigated.

Utilities that use a grounded wye distribution wiring system, and their experts, have claimed that the problems were all caused by poor wiring, worn insulation, faulty equipment, improper grounding on the farms, and poor management of livestock by the farmers.

Studies of voltages on farms by college agricultural engineers in Michigan, Minnesota, Nebraska, New York, Virginia, and Ontario (Canada) indicated that 30 to 81% of dairy farms had what was believed to be harmful amounts of voltage during the period 1980-83. A review of "Sources of Stray Voltage and Effect on Cow Health and Performance" by Appleman and Gustafson was published in 1985 [1].

In 1991 the opinions of experts, based on 60 Hertz alternating current (AC), sinusoidal voltage, were published in USDA-ARS Publication 696, ***Effects of Voltage/Current on Farm Animals.***

Publication 696 [18], called the "Redbook," became the standard for cow-contact stray voltage adopted by public utility commissions and utilities in several states. The standard usually accepted was a minimum of 0.5 Volt or 1 milliampere of 60 Hertz, steady-state voltage at cow contact points contributed by the utility, must be present for the utility to be responsible for correcting an electrical problem. Cow contact was defined as touching metal: water bowls, pipelines, stanchions, stall dividers, and feeding equipment. The standards were based on cow "sensitivity" studies and short-term experiments, limited exposure to electrical treatments, and too few cows with too large variations between groups to find statistically significant differences in milk production if such differences did exist [2]. In one trial, milk production was 11 to 17% less than controls when cows were exposed to 5 milliampere intermittent shocks for 2 weeks [12]. Power company stray voltage experts use a 500 Ohm resistor in the voltmeter circuit. The theory was that a voltage must be strong enough for the current to pass through the resistor to affect cows. Voltages less than approximately 0.5 volt, or 1.0 milliampere current, were not measured when resistors were in the voltmeter circuit, and were not considered important. The lower impedance of cows subjected to high frequency impulses, (perhaps by-passing the hoof by electrical coupling of the short-circuit from body to ground) was not considered.

However, the Redbook contained no information about effects of transients (electrical surges) or harmonics generated within the power lines by transients, oscillating at frequencies higher than 60 cycles per second, on the power lines. Harmonics are often called electrical noise and produce the humming, buzzing sound, and radio noise heard near electrical power lines. Professor Lloyd B. Craine, co-author of the Redbook, acknowledged, "...When consumer equipment consisted primarily of lights, motors, and tube-type electronic equipment, and electrical loads were relatively small, neutral-to-earth voltages and transients were not great problems, due to low neutral currents and the tolerance of the equipment. With increasing use of low-signal-level solid-state computers and microprocessors, increasing electrification and automation of farms, and increased loads on distribution lines, the issue of power quality and tolerable neutral-to-earth voltage is increasingly important." Craine recommended, "Transient-effects research is necessary to fully evaluate power system effects on animals." And "Dissemination of research results in particular case studies would be useful to inform farm personnel of new, different, or unusual problems with power system maintenance" [18, sec 6, pp. 2-4]. No reports of such studies have appeared in the agricultural literature during the intervening 10 years.

The Michigan Public Service Commission (MPSC) issued a

Stray Voltage Task Report in 1993. It was a summary of articles published in various research publications, but also contained investigative complaints from 31 Michigan farms. Commission employee, William O. English, P.E., Electrical Engineer found that on-farm wiring faults which allowed current to leak into the grounding system caused some of the stray voltage problems. In addition, he found that voltage and/or current from the power company's primary neutral-to-ground and possibly radiant energy by induction from power company 345 kV lines was also responsible for the voltage on some farms after the on-farm wiring faults were corrected.

In 1999, Dave Stetzer, Industrial Electrician, at Blair, Wisconsin, was asked by a milk company field man if he would "look into this stray voltage that dairy farmers claim is affecting their cows when the power company experts say, no stray voltage is there?" The electrician told him, I don't believe there is such a thing as "stray" voltage, because voltage follows the laws of physics, and the path of least resistance, but I will have a look!

While studying the electricity on over 100 farms with oscilloscope, and Fluke® Event Recorders for nearly a year without compensation, he observed that milk production went down as the number of transient voltage events per day went up. Statistical analysis of the data by dairy scientists at Michigan State University and The University of Florida using multi-herd multiple regression and SAS™ Inc. statistical procedures proved Stetzer's "eyeball" observation to be correct.

New Discoveries

Transients are unwanted, short-duration voltages, called spikes or surges, caused by the sudden release of stored energy on an electrical circuit. A transient voltage is produced from stored energy in the circuit inductance and capacitance. Oscillatory transients are commonly caused by turning OFF high inductive loads and by switching large utility power-factor correction capacitors. Nonlinear loads, such as electronic devices in computers, printers, microprocessors in appliances, EMR imaging in hospitals, battery charges, and variable speed motors, put transients on primary and secondary power line neutrals [11,16].

Fluke® Event Recorders VR101 plugged into 120-V outlets in the milkroom or milking parlor recorded transient events, transients, sags, and sag voltage (below specified), hot-to-neutral and neutral-to-ground voltages (Vp, peak-to-peak on the waveform), and phase angle degree of transients, swells (high voltage), outages and the time (h, min, sec) each occurred. Examples of EventView™ computer software printouts are in Figures 1 and 2.

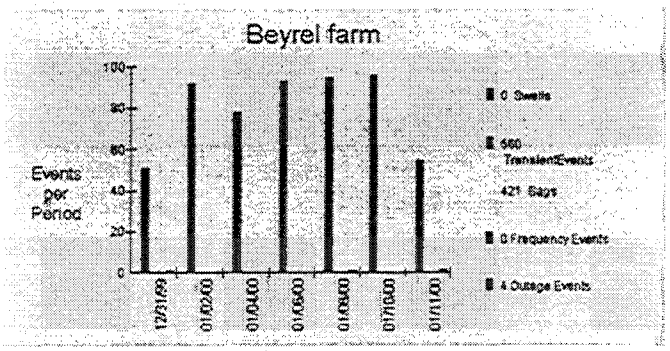

Figure 1. Measures of Power Quality Displayed from Fluke EventView™ Computer Software.

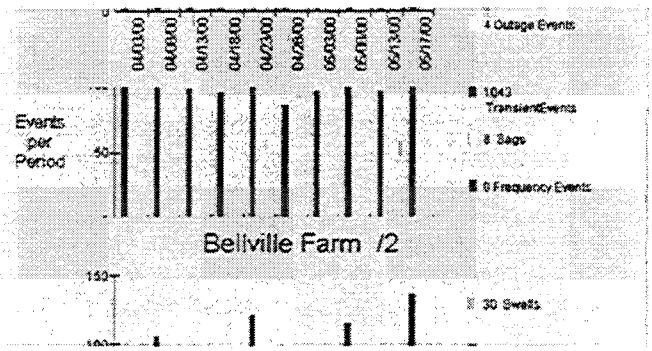

Figure 2. EventView Record of Transient Events. Event Recorder Thresholds H-N 100, N-G 50 Volts

Power Quality varied by Number of Transient Events from day to day and farm to farm. Event recorder threshold settings were 100-V hot-to-neutral and 50-V neutral-to-ground transients on circuits in 120-V wall outlets.

Transient Events averaged 20 ± 25.9 (standard deviation) and ranged from 0 to 122 per day on five farms, 515 data points (days) when the recorder was operating at least 23 hours per day as in Table 1.

	Trans. Events	Trans Oscilla-tions	H-N Trans. Events	H-N Vp	H-N ø Angle	N-G Trans. Events	N-G Vp	N-G ø Angle ° ->200°	Sags	Sags Vrms
Days / 515	515	515	385	385	389	191	191	144	261	261
Mean/day	19.6	182	11	-2367	166.2	8.7	-1793	26.3	25	2698
Std. Dev.	25.9	253	16.9	3349	61.7	16	1245	18.0	29	2636
Min	0	0	0	-21840	71	0	-7400	1	0	0
Max.	122	1939	89	1630	297	90	1170	90	166	18421
Ave./Tran.		9		-128	166.2		-79.9	73.7		108.3
Milk Coef.	-0.063									
P value Lin	0.025	0.025	0.03	0.21	0.001	0.27	0.27	0.10	0.02	0.02

Means = Average or sum per day for number days event occurred of possible 515.

Table 1. Event Recorder Measures of Power Quality for Five Herds Combined, 515 Data Points. Data Set 2.

Relationship of Transients to Milk Production. Milk tank weights were divided by the number of cows milked to determine milk per cow. Variations due to differences between farms, sequential dates, number of cows milked/day, transients and other known variables were included in multiple regression equations for determining effects of electrical measures on milk production.

Milk/cow per day decreased -0.063 lbs./Transient Event as the number of Transient Events increased per day, statistically significant (P<0.02). Thus 20 events x -0.063 lb. = -1.26 lb. average or -7.7 lbs./cow/day when the maximum 122 events/day occurred according to combined data of these five herds. Transient Events varied enormously from day to day and farm to farm.

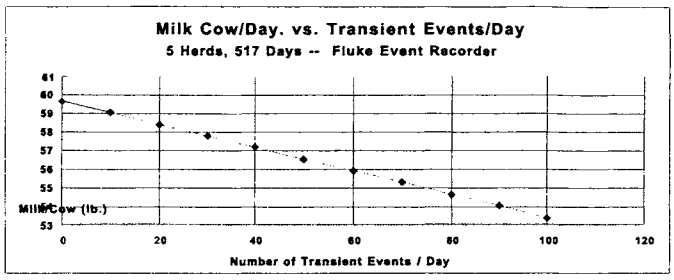

Figure 3. Relationship of Transient Events to Milk Production/Cow/Day, Five Farms, 517 Days.

Transients (the number of oscillations or spikes/day) averaged 182 ± 253 (SD) and ranged from 0 to 1939 per day. Eight electrical variables were found to be significantly related to milk production. They were: (1) number of transient events, (2) total transient degree angle/100, (3) number of hot-to-neutral transient events, (4) total H-N waveform phase degree angle/100, (5) total sum of neutral ground transients, (6) total sum of N-G transients with phase degree angle => 200º, (7) number of sags (voltage <108), and (8) Sag Voltage rms.

Oscilloscope "Step Potential" Voltage from the Floor of Milking Stalls. Step Potential Voltages, above 0.010 Vp (10 millivolts) measured from the floor of milking stalls and in barnyards, affected behavior and milk production of dairy cows in four herds for 535 days. This concurs with findings of Polk in Wisconsin herds [17].

Milk per Cow/Day decreased as the number of impulse frequencies = >90 Hertz increased per day. Frequency and duration of exposure were often more important than voltage *per se*. The interaction of sum of voltage readings x sum of frequency readings greater than 90 Hz was negatively correlated with milk production, linear regression (P<0.008).

Harmonics

Harmonics are integer multiples of 60 Hz frequencies, i.e., 2nd harmonic = 120 Hz, 3rd harmonic = 180 Hz, etc. The oscilloscopes ordinarily recorded impulses up to 2520 Hz (ELF range), the 42nd harmonic, although some impulses were in the rf range (3,000 Hz to 30,000 megahertz).

Milk per Cow decreased as the number of 3rd, 5th, and 7th harmonics increased daily in a four-herd data set with 535 days (data points) (P<0.001) and **Milk decreased as number of 21st and 42nd harmonics increased** in a 3-herd data set, 165 days (P<0.03).

Milk decreased as the sum of triplen harmonics increased/day. Triplens are the 3rd harmonic and odd numbered multiples of the 3rd harmonic. Triplens are produced by nonlinear loads which draw current only during the peak of the voltage waveform. Triplen harmonics are additive and may increase the neutral load to173 percent of the rms phase current, causing heating of circuits, transformers, and telephone interference [11,16].

Specifically the 3rd, 9th, 15th, 27th, 33rd, and 39th harmonics were recorded in data set 3. As the average daily sum of triplen harmonics increased from 3,648 to maximum 30,388 per day, milk production decreased from average -0.27 to -2.28 lb./day attributable to triplen harmonics (P<0.003).

Electrical Pathways--In a wye distribution system, electricity flows from the utility primary neutral to the earth via down grounds at transformers and at least four times per mile. Also, primary neutral is connected to secondary (customer) neutral-bus at the service entrance panel and is redirected to secondary circuits, equipment down-grounds, water and drain pipes, soil, concrete, and livestock or humans throughout the premises. Current/voltage follows the path of least resistance, which varies from time to time, depending on moisture, frozen or thawed and other conditions of soil, wires, pipes, connections, etc. as described by Ludington et al. [14].

Electric Fields – Electricity travels inside and outside of wires

Intensity of electric fields in milking stalls where the cows were standing was estimated by the methods of Chiba and Chen [6] using measured voltage and impedance (resistance) of cows from published values [1, 12], see Table 2.

Since voltage and frequency data were collected continuously for periods ranging from 54 to 204 days on the farms studied, the distribution of harmonics was calculated for each of the farms.

Electric-fields and Harmonic Distortion in Milking Stalls								
	Recorded	Event (1) Ave. + Std. Deviation	Total Harmonic	Different Harmonic	E-Field Ave.	E-field Max.	Voltage Harmonic	
Farm	No.	Volts (Vp) / Day	No./ Day	Number	kV/m Ave.	kV/m Max	THD Ave. %	THD Max. %
Eri	115	0.056 ± 0.01	39,805 ±23695	16	2.678	3.740	67.8	132.1
Bey	76	0.050 ± 0.01	34,593 ±10411	7	3.585	4.301	19.3	70.9
Pla	108	0.032 ± 0.01	9,746 ± 9403	11	2.150	4.482	29.9	79.6
Bel	54	0.039 ± 0.01	21,553 ± 26442	29	1.293	3.430	22.7	75.0
Wal	204	0.063 ± 0.04	44,084 ± 33,201	25	2.298	5.551	90.3	23.6

Event on the Oscilloscope was ± 3.0 standard deviations from the mean of voltages following the last event. Voltage= average recorded during events for the period.

Table 2. Electric fields for average and maximum event Voltage (Vp), estimated from Chiba in Chen (5), and Total Harmonic Distortion (THD) percent of 1st harmonic voltage.

IEEE 519-1992 sets current limits on the utility side of the meter as THD, usually 5% of 1st harmonic voltage. Similarly, limits are set by the same publication for Total Distortion Demand (TDD) which is the limit for end-user amperage contribution to harmonic distortion on the utility line [10]. THD was outside these limits on the farms studied.

Health Effects

Increased incidence of disease, higher somatic cells in milk, low reproductive efficiency, and abnormally high mortality of cows and calves are common in herds exposed to excessive electricity. Cows exposed to 10 kV/m electric fields during 28-day experiments in Quebec, Canada, had significant changes in proteins and electrolytes of cerebrospinal fluid which bathes and provides nutrition for the brain and nerves of the spinal cord [3,4]. These findings are consistent with changes in the permeability of membranes and electro-chemistry of molecules and ions passing from blood to cells and tissues. A farm cow in the present study was videotaped dancing on two feet while a 0.165 volt, 625 Hertz transient shock was recorded on the oscilloscope three times during one milking. The estimated electric field created by that transient was 29.6 kV/m, approximately three times the E-field intensity applied to the cows in Canada. Reduced water consumption of cows exposed to electricity has been assumed to be caused by reluctance to touch metal water bowls, which may be true under some conditions. However, Marino [15] reported that mice exposed to E-fields and EMF reduced water consumption even though electrical exposure was from the air (over-head), and no current was attached to the water supply. Exposed mice gained less weight in 9 of 10 experiments and had depressed levels of cortisol in the blood after several weeks of exposure. In experiments with cows, blood cortisol increased when cows were exposed for short periods at or near milking time, which would be typical of an immediate reaction to stress. Stress causes immediate increases in cortisol (fight or flight reaction, Selye) but continuous stress causes adrenal fatigue, as in Addison's disease. Electrical effects on the brain, pineal and pituitary glands, and autonomic nervous system which controls heart rate, hormone secretions, immune responses, bone calcification, blood electrolytes, and general metabolism, suggest likely relationships between poor reproduction, poor health, and low milk production.

California Department of Health released a report prepared for the PUC, July 2001, concerning health risks from electric and magnetic fields from power lines in the home or workplace. They concluded more than 50% chance of a small increased risk of childhood leukemia, adult brain cancer, and amylotrophic lateral sclerosis (ALS -- Lou Gehrig's Disease), and more than 50% chance of 5-10% added miscarriages, 10-50% increased risk of male breast cancer, childhood brain cancer, suicide, Alzheimer's disease, or sudden cardiac death. Others warned about increased health risks [15], eryrthroleukemia [5], and disturbed sleep patterns and suicide [19].

CONCLUSIONS:

Step-potential voltage beginning at about 0.01 V (10 mV) was negatively correlated with milk production, and positively correlated with steps per minute. Milk production/cow decreased as the number of transient and harmonic impulses increased per day. Use of 500 ohm resistors in voltmeter circuits obscures higher frequency lower voltage that is harmful to cows. Effects of power quality, e.g., transient and harmonic impulses are not addressed in stray voltage literature. Power quality problems reported in this study were not due to stray voltage as described by stray voltage experts.

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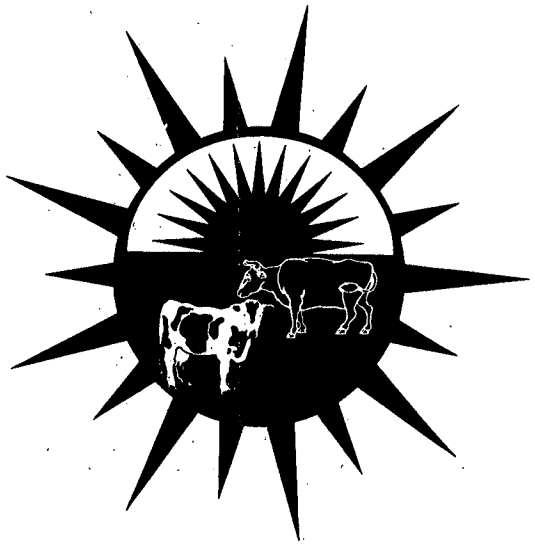
No part of the golf tournament fee is considered tax deductible.

Questions? Call Rich Hergert, (970) 352-1821

18th Annual SOUTHWEST NUTRITION & MANAGEMENT CONFERENCE

February 20 & 21, 2003
Phoenix, Arizona



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Ask for Southwest Nutrition and Management Conference block - $135 + tax, or next door at the Holiday Inn Express - $115 + tax. 2-room suites are available at $145 + tax. Reservations should be made well in advance as February is a very busy tourist month in Arizona.

Free transportation is available from Sky Harbor Airport to the Hawthorn Hotel.

In compliance with ADA requirements, participants with special needs can be reasonably accommodated by contacting the organizer's office at least 10 working days prior to the conference. We can be reached by phone at (520) 621-3375, fax at (520) 621-9435, or email SWNMC@ag.arizona.edu

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Conference attendance has been approved by ARPAS for 8 hours of continuing education credits

Arm & Hammer Animal Nutrition Group Pre-Conference Symposium

Thursday, February 20, 2003

7:45 am Registration Desk Opens

8:45 am Coffee in lobby

9:00 am Introduction, Loren Poncia

9:10 am Production Solutions,
Dr. Kenneth Cummings

9:45 am The Sciences Behind Essential Fatty Acids,
Dr. Elliot Block

10:20 Break

10:40 am Application & Case Studies of Feeding
Essential Fatty Acids, Dr. Bill Sanchez

11:15 am Why this is so important - Economic Impact at the Dairy Level, Dr. Steve Eicker

11:50 am Closing Remarks, Loren Poncia

Southwest Nutrition and Management Conference

1:30 pm WELCOME Dr. Robert Collier

1:40 pm Water Use by Forage Crops Used in Cattle Feeding,
Dr. F. T. McCollum III

2:20 pm Intensified Feeding of Calves - Application and Outcomes,
Dr. Michael Van Amburgh

3:00 pm BREAK/Refreshments

3:20 pm Reduction in N Losses in Manure by Feed-Additives,
Ken Eng, Ph.D.

4:00 pm The Latest on Amino Acid Feeding,
Dr. Charles G. Schwab

5:00 pm RECEPTION sponsored by:
Arm and Hammer Animal Nutrition Group

Southwest Nutrition & Management Conference

(continued)
Friday, February 21, 2003

9:00 am The Latest Developments on Johne's Disease
Dr. Michael T. Collins, DVM

9:40 am Myotic Infections in Livestock: Recent Studies on Etiology and Diagnostics,
Dr. Neil Forsberg and Steve Puntenney

10:20am BREAK/Refreshments

10:40am Mycotoxin Interactions in Livestock
Dr. John Doerr

11:00am Managing Weather Risks
Dr. Elwynn Taylor

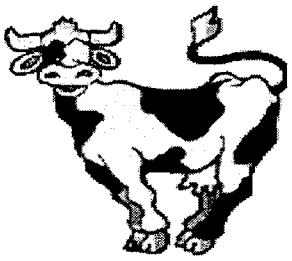
11:40am Closing Remarks - Dr. Robert Collier

Southwest Nutrition and Management Coordinating Committee

Moe Bakke, Custom Dairy Performance
Robert Collier, University of Arizona
Glenn Duff, University of Arizona
Ken Eng, Eng, Inc.
Robert Kattnig, University of Arizona
Ken McGuffey, Elanco Animal Health
Fred Owens, Pioneer HiBred Int'l Corporation
Bill Prokop, Monsanto Dairy Business
Ueli Zaugg, Zaugg Dairy Nutrition

Golf Tournament Committee

Rich Hergert, Hergert Nutritional Services
Kevin Maloney, H.S. Baker and Brothers
Gary Winter, Novus International, Inc.
Ueli Zaugg, Zaugg Dairy Nutrition



The DOLLARS and *SENSE* of COW CULLING

You can look at a cow and make the decision to cull. Do you wait too long? Do you cull too early? Join us January 31, 2003 — Dr. Eicker, DVM will present ways to make **Dollars and Sense** decisions by combing financial data with production and health reports. You will have the chance to ask questions of loan officers. Representatives from Dairy Comp and DHI Plus will be on hand to help you get more information from your Dairy Herd Management Software Package.

The Seminar:

January 31, 2003, Central Arizona College, Room M101

9:15 - 9:45	Registration, Coffee, Milk and Donuts
9:45 - 10:00	Introductions, Pat Harrington, Farm Business Management
10:00 - 11:30	**The Dollars and Sense of Cow Culling**, Dr. Stephen Eicker, DVM
11:30 - 12:00	The Loan Officer's Perspective – Panel Discussion Moderator: Steve Reiley, Farm Credit Services Southwest
12:00 - 1:00	Lunch
1:00 - 2:30	Break Out Sessions with Dairy Comp and DHI Plus Your opportunity to get more out of your Package Dairy Comp -- Dr. Eicker, DVM DHI Plus – Stephen Smith

Venue: Room M101, Central Arizona College, Signal Peak Campus, Coolidge, AZ.
The M Building (clock tower on the roof) is located in the middle of the campus.

Directions: From I-10, take Exit 190 to McCartney Road (slightly northeast of Casa Grande). Turn east on McCartney Road -- 3 miles to Overfield Road. Turn north on Overfield Road – 1 mile to the College entrance.

Fee: Pre-Registration -$50.00 per participant (phone or e-mail to register by **January 27**, 2003).
Late Registration - $60.00.

Coordinator: **For all materials and registration contact:**
Pat Harrington
Farm Business Management
Central Arizona College, 8470 North Overfield Road, Coolidge, AZ 85228

Office: 520-426-4326 *Cell*: 520-560-0562
e-mail: pat_harrington@centralaz.edu

ARIZONA – TOP 50% FOR F.C.M. [b]
NOVEMBER, 2002

OWNERS NAME	Number of Cows	MILK	FAT	3.5 FCM	DAYS OPEN
* Stotz Dairy	1965	28,466	1023	28,899	180
University of Arizona Holsteins	179	26,248	941	26,611	162
Martha Linda Dairy	1900	25,544	942	26,322	178
* Mike Pylman Dairy	2575	25,419	903	25,635	166
* Arizona Dairy North	2650	24,812	876	24,935	178
* Stotz Dairy East	1374	24,852	874	24,919	204
* Hillcrest Dairy	2354	24,774	851	24,514	168
University of Arizona Brown Swiss	103	22,860	902	24,513	113
* Arizona Dairy South	3286	24,571	855	24,491	158
* DC Dairy, LLC	1056	23,523	863	24,167	160
* Del Rio Holsteins	1254	23,682	847	23,977	147
Paul Rovey Dairy	439	23,592	844	23,888	138
Desert Ridge Dairy LLC2	476	23,681	831	23,617	156
* Wigwam Dairy	1421	23,088	838	23,573	158
* Zimmerman Dairy	1203	23,087	826	23,378	180
Butler Dairy	631	22,978	812	23,105	200
* Danzeisen Dairy, LLC	1171	22,536	812	22,913	143
Desert Ridge Dairy LLC	1372	21,171	815	22,805	149
* Saddle Mountain Dairy	2074	23,583	763	22,570	151
* Del Rio Brown Swiss	187	21,188	793	22,023	116
* Dutch View Dairy	1679	21,990	765	21,914	183
Treger Holsteins, Inc.	512	21,564	772	21,844	172
Gladtime West Holsteins	346	21,939	750	21,650	206
* RG Dairy, LLC	1310	21,648	757	21,637	139
Parker Dairy	4236	20,656	778	21,549	166
* Dairyland Milk Company	2457	21,751	739	21,389	139
* Goldman Dairy	1992	21,202	750	21,330	188

OWNERS NAME	Number of Cows	MILK	FAT	3.5 FCM	DAYS OPEN
* Pareo Dairy #1	1369	26,464	934	26,591	
* Hafliger Dairy	1653	25,208	927	25,934	134
* Do-Rene Dairy	3450	25,123	877	25,086	127
McCatharn North Dairy	1034	24,949	836	24,346	160
* Hide-Away Dairy	2192	24,651	857	24,558	115
Ken Miller Dairy	386	24,325	811	23,671	139
* Tallmon Dairy	538	24,174	852	24,271	167
S.A.S. Dairy	2025	23,908	861	24,302	142
Pareo Dairy #2	2843	23,811	884	24,633	142
Price's Roswell Farm	2809	23,057	823	23,317	131
* Goff Dairy	4336	22,764	817	23,093	
* Providence Dairy	2486	22,742	762	22,192	146
* Vaz Dairy	1567	22,335	765	22,064	154

* 3X a day milking

[b] average milk and fat figure may be different from monthly herd summary; figures used are last day/month

HIGH COW REPORT
NOVEMBER, 2002

MILK

Arizona Owner	Barn #	Age	Milk	New Mexico Owner	Barn #	Age	Milk
* Mike Pylman Dairy	3757	5-1	43,150	* Providence Dairy	3265	5-01	39,960
* Mike Pylman Dairy	4427	4-11	41,520	Mariposa Dairy Farm	TX723	12-01	39,590
* Stotz Dairy West	14671	3-1	41,500	* Hide-Away Dairy	2995	4-03	38,850
* Mike Pylman Dairy	4252	4-11	40,070	* Hide-A-way Dairy	2592	5-06	37,920
* Mike Pylman Dairy	2620	7-10	39,440	Pareo Dairy	7645	5-11	37,695
* Arizona Dairy South	51787	4-1	39,300	* Do-Rene Dairy	570	5-06	37,580
* Hillcrest Dairy	2967	3-4	38,899	* Do-Rene Dairy	1911	5-06	37,420
* Stotz Dairy West	9796	8-10	38,870	* Hide A-way Dairy	2105	6-06	37,130
* U of A Holsteins	88	6-3	38,825	Pareo Dairy	2040	6-09	36,862
* Stotz Dairy West	11280	5-11	38,500	S.A.S. Dairy	887	9-07	36,849
* Stotz Dairy West	12561	4-10	38,010				

FAT

* Stotz Dairy West	14671	3-1	1592	* Hafliger Dairy	943	6-06	1584
* Stotz Dairy West	19493	4-6	1530	Mariposa Dairy Farm	TX723	12-01	1544
* Mike Pylman Dairy	4726	4-6	1493	* Hafliger Dairy	5965	8-06	1451
* Mike Pylman Dairy	6546	5-7	1473	Price's Roswell Farm	3031	3-04	1433
* Mike Pylman Dairy	4397	4-11	1461	S.A.S. Dairy	2151	6-11	1402
* Mike Pylman Dairy	5079	4-1	1458	* Hafliger Dairy	6783	4-03	1381
* Mike Pylman Dairy	2620	7-10	1450	* Hafliger Dairy	6809	4-03	1367
* Mike Pylman Dairy	5400	3-9	1448	McCatharn Dairy	1203	5-04	1365
* Stotz Dairy West	11280	5-11	1441	Mariposa Dairy Farm	SC-W967	4-01	1340
Stotz Dairy West	19467	4-7	1435	Pareo Dairy	1520	5-01	1339
U of A Holsteins	88	6-3	1428				

PROTEIN

* Mike Pylman Dairy	4427	4-11	1214	Mariposa Dairy Farm	TX723	12-01	1306
* Stotz Dairy West	14671	3-1	1190	S.A.S. Dairy	3433	4-10	1160
* Mike Pylman Dairy	2620	7-10	1160	Pareo Dairy	7645	5-11	1140
* Mike Pylman Dairy	3757	5-1	1095	* Goff Dairy	4762	6-06	1130
* Stotz Dairy West	11280	5-11	1079	* Providence Dairy	3265	5-01	1128
* Stotz Dairy West	19493	4-6	1078	* Hide-Away Dairy	2769	5-06	1126
* Mike Pylman Dairy	875	5-7	1078	* Do-Rene Dairy	804	10-09	1107
* Stotz Dairy West	19504	4-6	1078	* Hafliger Dairy	6818	4-03	1105
* Danziesen Dairy LLC		4-0	1075	Mariposa Dairy Farm	SC-B862	4-01	1102
* Dutch View Dairy	320	5-6	1072	S.A. S. Dairy	3920	3-11	1096

* 3X milking

ARIZONA AND NEW MEXICO HERD IMPROVEMENT SUMMARY FOR OFFICIAL HERDS TESTED NOVEMBER, 2002

		ARIZONA	NEW MEXICO
1.	Number of herds	51	26
2.	Total cows in herd	74,804	46,301
3.	Average herd size	1467	1781
4.	Percent days in milk	84	86
5.	Average days in milk	191	202
6.	Average milk – all cows per day	55.1	58.3
7.	Average percent fat – all cows	3.6	3.7
8.	Total cows in milk	62,835	39,864
9.	Average daily milk for milking cows	63.9	67.5
10.	Average days in milk – 1st breeding	82	73
11.	Average days open	157	147
12.	Average calving interval	13.9	13.9
13.	Percent somatic cell – linear 0-4	79	75
14.	Percent somatic cell – linear 5-6	12	15
15.	Percent somatic cell – linear 7 & above	9	7
16.	Average previous days dry	63	67
17.	Percent cows leaving herd	32	34
		STATE AVERAGE	
	MILK	22,006	22,147
	Percent butterfat	3.6	3.6
	Percent Protein	3.0	3.0
	Pounds fat	803	789
	Pounds protein	660	663

ARIZONA COOPERATIVE EXTENSION
U.S. DEPARTMENT OF AGRICULTURE
The University of Arizona
Tucson, Arizona 85721

OFFICIAL BUSINESS
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Mark your calendar

- Dollars and Sense of COW CULLING, January 31 , 2003, Coolidge AZ
- Southwest Nutrition and Management Conference, Phoenix, Arizona, February 20-21 , 2003
- Arizona Dairy Day, Phoenix, Arizona, March 7, 2003
- Western Dairy Management Conference, Reno, Nevada, March 1 2-1 4, 2003
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