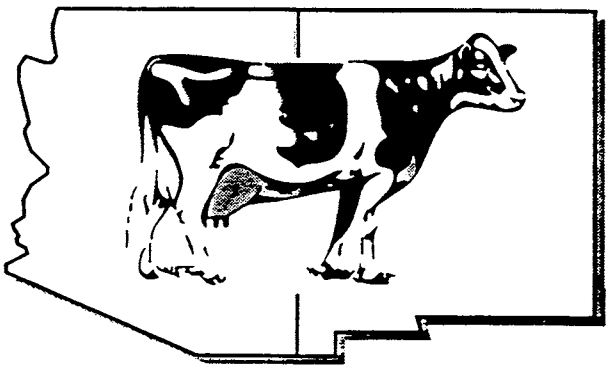
ARIZONA & NEW MEXICO DAIRY NEWSLETTER



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MAY, 2002

This Month's Article:

"Strategies to Reduce Antibiotic Residues in Market Dairy Cows"

C.A. Rogers, A.C. Fitzgerald, M.A. Carr, B.R. Covey, J.D. Thomas, and M.L. Looper
New Mexico State University

Southwest Nutrition and Management Conference Proceedings are now available on our new website:

http://animal.cals.arizona.edu/swnmc.php

Check it out!

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

The following videos are available for checkout from Mike Looper, New Mexico State University. To obtain a video call Kathy Bustos, (505) 646-3325 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.

University of Arizona
Department of Animal Sciences
P O Box 210038, Shantz Bldg, Room 205
Tucson, AZ 85721

New Mexico State University
Extension Animal Resources
Box 30003 Dept. 3AE
Las Cruces, NM 88003

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STRATEGIES TO REDUCE ANTIBIOTIC RESIDUES IN MARKET DAIRY COWS[1]

C.A. Rogers[2], A.C. Fitzgerald[2], M.A. Carr[3], B.R. Covey[2], J.D. Thomas[2], and M.L. Looper[2]

[2]New Mexico State University, Las Cruces 88003, [3]Angelo State University, San Angelo, TX 76909

ABSTRACT: A three-phase study was conducted to identify management strategies to reduce antibiotic residue violations and increase carcass merit in market dairy cows. Questionnaires (Phase I) were mailed to 145 dairies to determine marketing strategies. Holstein market cows (n = 77) from four dairies were randomly assigned to one of three feeding treatments (0, 30, or 60 d) in Phase II. Carcass characteristics (longissimus area, backfat, fat color, and marbling), ADG and body condition scores (BCS) were assessed. Phase III determined the meat withdrawal time of 62 cows administered penicillin G procaine (1 mL/45 kg BW, i.m.; 10-d meat withdrawal). Urine from penicillin-treated cows was tested using a β-lactam specific enzyme-linked immunosorbent assay. In Phase I, 29% of dairy producers, representing 64,296 lactating cows, responded. Questionnaires indicated five percent of market cows were condemned annually, predominately for malignant lymphoma or cancer eye. Fifty-seven percent of respondents utilized computerized medication records. In Phase II, BCS increased in 60-d cows ($P = 0.09$; BCS = 3.2) compared to 30-d cows (BCS = 2.8). However, ADG was greater ($P < 0.05$) in 30-d cows than 60-d cows (1.4 vs 0.9 kg/d, respectively). Additional feeding did not influence ($P > 0.10$) carcass characteristics studied. Hot carcass weights were similar ($P > 0.10$; 284, 274, and 296 kg for 0, 30, and 60-d cows, respectively). Kidney, pelvic and heart fat was different ($P < 0.05$) among feeding groups (1.4, 1.0 and 2.1% for 0, 30, and 60-d cows, respectively). Incidence of condemnation was 8.3, 10 and 0% for 0, 30 and 60-d cows, respectively ($P > 0.10$); condemnations were not the result of antibiotic residues. In Phase III, 31% of cows treated with penicillin G procaine exceeded the 10 d label withdrawal recommendation by an average of 3.1 d (range 1 to 8 d). Feeding market cows can increase BCS, ADG and decrease condemnation, but may not influence carcass characteristics. Furthermore, antibiotic-treated market cows may exceed recommended meat withdrawal times and cause antibiotic residue violation at processing.

Key words: Dairy cow, Antibiotic residue, Carcass characteristics

Introduction

Food safety is an important issue for the dairy industry. Use of antibiotics has significantly improved the health and production efficiency of food-producing animals; however, antimicrobial resistance of animal bacteria is of concern. Antibiotic residues in meat consumed from food-producing animals may alter the dynamics of microflora in the intestinal tracts of humans (Witte, 1998).

Although substantial quantities of quality milk are the primary concern of dairy producers, approximately 33% of beef production in the U.S is from market dairy cows (Smith et al., 1994). According to Smith et al. (1994), 1.7% of dairy cows violated antibiotic residues in 1990, 2.2 and 1.54% in 1991 and 1993, respectively. Antibiotic residue violations were the primary concern of industry representatives surveyed in the current National Market Cow and Bull Quality Audit (Roeber et al., 2001).

Research has indicated additional feeding of market cows can increase body condition score (**BCS**), carcass value, and carcass characteristics (Jones et al., 1983; Apple et al., 1999). Matulis et al. (1987) reported ADG was most efficient in market cows between 29 and 56 d on feed. Similarly, Schnell et al. (1997) found market cows were significantly less efficient during the first 14 d on feed. Averaged daily gains increased linearly from 28 to 56 d in market dairy and beef cows (Schnell et al., 1997).

Feeding a high-energy diet to market cows can increase fat cover and potentially increase profits to the producer (Jones, 1983; Apple, 1999). Market cows with moderate body condition yield higher quality carcasses that can be fabricated into boneless subprimal cuts (Apple et al., 1999). Fat cover also been reported to decrease bruising associated with transport (Smith et al., 1994).

The objectives of this study were 1) to determine current marketing strategies of excess dairy cows, 2) investigate the influence of additional feeding (30 or 60 d) of market dairy cows on carcass quality, and 3) to determine antibiotic meat withdrawal in dairy cows.

Materials and Methods

Phase I. Questionnaires were mailed to 145 dairies in New Mexico to obtain information on marketing strategies. Dairy producers were asked standard management procedures for market cows (i.e., replacement rates, record keeping, and auction barn or packing plant utilization). Producers also were asked to provide reasons for culling (i.e., poor milk yield, reproductive failure,

[1]Research funded through a grant from the Beef Quality Check-Off program of the National Cattlemen's Beef Association.

mastitis, etc.) and incidence of condemned cows as a result of antibiotic residues per year.

Phase II. Seventy-seven non-lactating Holstein market cows were obtained from four dairies in Southern New Mexico and randomly assigned to a control group (0 d) or to one of two feeding treatments (30 or 60 d).

Cows were blocked by pen with two to three cows per pen. Prior to the experimental feeding period, all cows were weighed, assigned a BCS (1 = emaciation, 5 = obese; Wildman et al., 1982), and administered an oral probiotic gel paste (30 g; RXV-BP-1 Bovine, AGRIpharm®, Grapevine, TX). The probiotic paste contained a bovine specific mixture of bacteria. Furthermore, additionally fed cows were treated intramammary with cephalpirin sodium (ToDAY® tubes). Cows were fed twice daily a total mixed ration (TMR) consisting of 60% high-energy concentrate and 40% quality alfalfa hay (Table 1). Amount of feed was adjusted per feeding based on pen intake. Weigh-backs were recorded weekly.

After the designated feeding time (30 or 60 d), cows were transported to Lonestar Packing, San Angelo, TX. Carcass data was collected and included hot carcass weight (**HCW**), longissimus muscle area (**LMA**), kidney, pelvic, heart fat (**KPH**) percentage, backfat, marbling, and fat coloring. Marbling scores were converted to a scale where 100 = practically devoid, and 200 to 900, in increments of 100, represent traces, slight, small, modest, moderate, slightly abundant, moderately abundant, and abundant, respectively. Yellow fat was scored on a 5-point scale, where 0 = none to 4 = severe. Cows (n = 5 groups; 3 to 10 cows/group) transported to Lonestar packing from local dairies at the same time as the 30 or 60 d fed cows were used as control cows (0 d on feed). Body weight and BCS was assigned prior to shipping.

Phase III. To determine meat withdrawal of unhealthy (predominately mastitis) dairy cows (n = 62) administered penicillin G procaine (Pfi-Pen G; Pfizer Animal Health, New York, NY; 1 mL/45 kg BW, i.m.; 10 d meat withdrawal), urine was collected and tested with a β-lactam specific enzyme-linked immunosorbent assay (Meatsafe™ Residue Test; SilverLake Research, Monrovia, CA). Urine testing occurred from two days prior to label withdrawal time and continued until clearance of antibiotic residue was evident using ELISA test.

Statistical Analyses. Analyses of variance were performed using the GLM procedure of SAS (SAS Inst. Inc., Cary, NC) to determine the effect of feeding treatment on BW, BCS ADG, and carcass characteristics (HCW, KPH, fat thickness, LMA, and marbling). Treatment means were compared using the PDIFF statement of SAS when protected by a significant ($P < 0.05$) treatment effect. Chi-square analysis, using the FREQ procedure of SAS, was used to determine the frequency of condemnation.

Results and Discussion

Phase I. Twenty-nine (42/145) percent of dairy producers responded to questionnaires, representing 64,300 lactating cows, with an average herd size of 1,461 cows. Replacement rates averaged 31%; producers reported predominant reasons for cows leaving the herd included poor milk yield (31%), reproductive failures (25%), and chronic mastitis (13%). Similarly, Gröhn et al. (1998) found reasons for culling included milk fever (47.1%), mastitis (32.7%), retained placenta (31.7%), and ovarian cysts (20.9%).

Fifty percent of producers indicated a preference for selling market cows to both auction barns and packing plants. Forty percent indicated preferences for sending cows only to auctions and 10% only sent directly to the packer. Producers choose the auction or packing plants depending on market prices and convenience (location relative to the dairy).

Of cows sent to packers, an average of 5% were condemned annually per dairy. Reasons for condemnation included predominantly cancer (34%) and downer cows (26%), with occurrences of pneumonia (7%), peritonitis (5%), and other diseases (7%; mastitis, septicemia, Johnes, and edema).

Fifty-seven percent of respondents utilized computerized medication records, 36% utilized handwritten records while 7% did not maintain medical records.

Phase II. Feed intake did not differ ($P > 0.10$) between feeding treatments (17.7 and 17.3 kg/cow/d). Body condition scores increased ($P = 0.09$) in 60-d cows (BCS = 3.2) compared to cows fed for 30 d (BCS = 2.8; Table 2). However, ADG was greater ($P < 0.05$) in 30-d cows than 60-d cows (1.4 and 0.9 kg/d, respectively). Consistent with Matulis et al. (1987) ADG was increased between 29 and 56 d of feeding.

Additional feeding did not influence ($P > 0.10$) carcass characteristics studied (Table 3). Hot carcass weights, marbling scores and LMA were all similar ($P > 0.10$) among treatments. However, Apple (1999) and Apple et al. (1999) found HCW, marbling and LMA increased linearly with increased BCS in beef cows.

Back fat means were similar ($P > 0.10$). Fat color did not differ ($P > 0.10$) between treatments. Percent KPH was different ($P < 0.05$) among feeding groups. These results are presented in Table 3. Similarly, Apple et al. (1999) observed KPH to increase with increased BCS. In the current study, cows fed for an additional 30 d had increased ADG and decreased KPH. Cows fed for 60 d tended to have increased carcass merit.

Incidence of condemnation was 8.3, 10, and 0% for 0, 30 and 60-d cows, respectively and was not affected ($P > 0.10$) by feeding treatment. Condemnations resulted from various conditions (i.e. lymphoma, septicemia, and pyemia) and were not the result of antibiotic residues. The 1998 Food Safety and Inspection Service condemnation report (USDA-FSIS, 1999) indicated epithelioma, lymphosarcoma, septicemia, pyemia and pneumonia as the five top reasons for condemning carcasses. Although not significant, additional feeding decreased the incidence of carcass condemnation.

Phase III. Thirty-one percent of cows treated with penicillin G procaine exceeded the 10 d label withdrawal recommendation by an average of 3.1 d (range 1 to 8 d; Figure 1). Unhealthy cows will have reduced feed intake and water. Furthermore, metabolism is probably decreased in unhealthy cows and may partially explain why 31% of

cows treated with pencillin G procaine exceeded the label withdrawal period.

Implications

Feeding market cows can increase BCS, ADG and decrease condemnation, but may not significantly influence carcass characteristics. Furthermore, antibiotic-treated market cows may exceed recommended meat withdrawal times and cause antibiotic residue violation at processing. Health and the ability to gain weight are extremely variable in market cows; therefore, not all market cows are suitable candidates for additional feeding protocols. Dairy producers should evaluate individual market cows and consider management strategies, such as additional feeding, to decrease the incidence of carcass condemnation and antibiotic residues in meat tissues.

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Table 1. Total mixed ration of 60% grain and 40% forage fed to market dairy cows for 30 or 60 d

Corn, flaked	38.9%
Soybean hulls	11.9%
Soybean meal	3.5%
Molasses	2.8%
Mineral Mix	1.9%
Fat, animal	1.0%
Alfalfa hay	40%

Table 2. Body condition score (BCS) and average daily gain (ADG) of market dairy cows fed 0, 30 or 60 d

	Treatment		
Trait	0 d	30 d	60 d
Pre-BCS	--	2.2	2.6
Post-BCS	2.6	2.8[a]	3.2[b]
ADG (kg)	--	1.4[c]	0.9[d]

[a,b]Values within a row with different superscript letters differ (P = 0.09).

[c,d]Values within a row with different superscript letters differ (P < 0.05).

Table 3. Hot carcass weight (HCW), longissimus muscle area (LMA), percent kidney, heart and pelvic fat (% KPH), fat thickness and color of market dairy cows fed 0, 30 or 60 d

	Treatment			
Trait	0 d	30 d	60 d	SE[c]
HCW (kg)	284	274	296	52
LMA (cm^2)	78.7	80.6	78.1	16.3
% KPH	1.6[b]	1.0[c]	2.1[a]	0.4
Fat thick (cm)	0.33	0.25	0.33	0.13
Fat color[d]	0.52	0.19	0.39	0.7

[a,b]Values within a row with different superscript letters differ ($P < 0.05$).
[c]Pooled standard error.
[d]Using a 5-point scale for visual appearance of yellow fat (0 = none to 4 = severe).

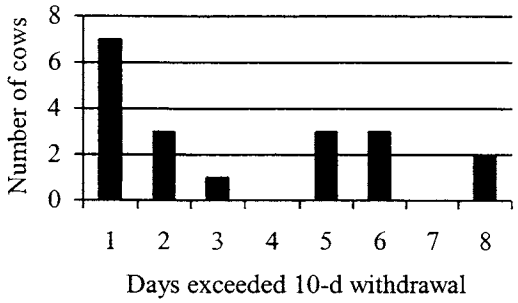

Figure 1. Number of cows exceeding 10-d withdrawal of penicillin G procaine.

High Cow Report
APRIL, 2002

MILK

Arizona Owner	BarnNum.	Age	Milk
* Stotz Dairy West	19634	3-11	38,500
* Zimmerman Dairy	5355	3-6	38,040
* Mike Pylman Dairy	4117	4-4	37,780
* Stotz Dairy West	6892	5-8	35,390
* Hillcrest Dairy	2264	3-10	35,089
* Saddle Mountain Dairy	9969	3-2	34,840
* Mike Pylman Dairy	5588	3-2	34,370
* Rio Blanco Dairy	1546	5-10	34,070
* Stotz Dairy West	14046	3-1	33,970
* Stotz Dairy West	6488	6-5	33,870

New Mexico Owner	BarnNum.	Age	Milk
* Hide Away Dairy	2876	4-03	39,270
* Hafliger Dairy	2893	6-06	36,200
* Hafliger Dairy	6360	4-03	36,020
* Hafliger Dairy	5970	9-08	35,790
* Do-Rene Dairy	3360	4-03	35,440
* Hide Away Dairy	2814	4-03	35,150
Pareo Dairy	243	5-08	34,687
Pareo Dairy	777	6-06	34,417
* Hafliger Dairy	447	5-06	34,330
Goff Dairy	14091	3-04	34,220

FAT

Arizona Owner	Barn Num	Age	Fat
* Stotz Dairy West	19575	4-0	1552
Martha Linda Dairy	5975	3-10	1385
* Mike Pylman Dairy	3329	5-3	1367
* Stotz Dairy West	6892	5-8	1361
Martha Linda Dairy	260	4-6	1348
* Withrow Dairy	15442	2-0	1340
* Withrow Dairy	4530	1-11	1337
* Withrow Dairy	1792	2-0	1322
* Rio Blanco Dairy	2879	4-3	1317
* Stotz Dairy West	12200	4-6	1291

New Mexico Owner	Barn Num	Age	Fat
* Hide Away Dairy	3011	4-03	1502
* Hafliger Dairy	6540	4-03	1450
* Hafliger Dairy	447	5-06	1444
* Hafliger Dairy	6360	4-03	1437
* Hafliger Dairy	702	5-06	1400
* Hafliger Dairy	32	7-06	1334
* Hafliger Dairy	896	5-06	1320
Ken Miller Dairy	626	4-07	1307
* Hafliger Dairy	1741	7-06	1295
* Hafliger Dairy	5422	4-03	1291

PROTEIN

Arizona Owner	Barn Num	Age	Protein
* Stotz Dairy West	19634	3-11	1093
* Mike Pylman Dairy	4117	4-4	1034
* Stotz Dairy West	19575	4-0	1028
* Stotz Dairy West	13346	3-6	1016
* Stotz Dairy West	6892	5-8	1000
* Mike Pylman Dairy	5588	3-2	995
* Martha Linda Dairy	260	4-6	993
* Hillcrest Dairy	2264	3-10	983
* Stotz Dairy West	12200	4-6	960
* Hillcrest Dairy	2397	3-7	959
* Mike Pylman Dairy	2882	6-7	959

New Mexico Owner	Barn Num	Age	Protein
* Hafliger Dairy	6360	4-03	1087
* Do-Rene Dairy	3360	4-03	1079
* Hafliger Dairy	6483	4-03	1062
Goff Dairy	14091	3-04	1051
* Do-Rene Dairy	3278	5-06	1027
* Hafliger Dairy	2893	6-06	1023
* Hafliger Dairy	447	5-06	1022
* Do-Rene Dairy	1498	7-06	1022
* Ken Miller Dairy	626	4-07	1019
* Do-Rene Dairy	3517	4-03	1018

* 3X day milking

APRIL, 2002
ARIZONA - TOP 50% FOR F.C.M.[b]

OWNERS NAME	Number of Cows	MILK	FAT	3.5 FCM	Days in Milk
* Red River Dairy	4006	26,817	954	37,068	186
* Stotz Dairy West	2064	27,293	943	27,094	220
University of Arizona Holsteins	160	26,188	944	26,633	228
Martha Linda Dairy	1838	25,129	918	25,754	193
* Mike Pylman Dairy	2580	25,231	883	25,229	215
* Stotz Dairy East	1504	25,704	868	25,190	222
Paul Rovey Dairy	428	24,555	871	24,742	191
* Hillcrest Dairy	2420	24,934	840	24,404	210
Desert Ridge Dairy, LLC2	517	24,338	834	24,050	190
* Zimmerman Dairy	1191	23,805	839	23,899	227
University of Arizona Brown Swiss	131	22,238	869	23,709	217
* Arizona Dairy Company North	2638	23,489	829	23,602	201
* DC Dairy, LLC	1084	22,904	838	23,494	203
* Wigwam Dairy	1498	22,785	806	22,923	221
* Del Rio Holsteins	1215	22,847	808	22,983	178
Butler Dairy	613	20,492	749	21,008	149
* Saddle Mountain Dairy	2205	23,609	765	22,613	201
* Dutch View Dairy	1573	22,087	770	22,037	225
* Dairyland Milk Company	2463	21,901	761	21,811	166
* Danzeisen Dairy, LLC	1280	20,602	769	21,380	193
* Del Rio Brown Swiss	163	20,492	749	21,008	149
Parker Dairy	4436	20,251	750	20,920	224
* RG Dairy, LLC	1322	20,929	731	20,904	198
* Gladtime West Holsteins	337	21,076	724	20,855	213
Lunts Dairy	542	20,146	737	20,663	206

TOP 50% ACTUAL MILK - OFFICIAL & UNOFFICIAL HERDS FOR NEW MEXICO

OWNERS NAME	Number of Cows	MILK	FAT	3.5 FCM	Days in Milk
* Hafliger Dairy	1785	25,723	944	26,432	215
* Pareo Dairy #1	1372	25,384	934	26,124	193
McCatharn North Dairy	1055	24,876	854	24,607	181
Ken Miller Dairy	310	24,833	833	24,247	210
* Do-Rene Dairy	2460	24,740	834	24,223	191
* Pareo Dairy #2	2695	24,409	915	25,394	183
Price's Roswell Farm	2726	24,029	879	24,646	203
* S.A.S. Dairy	2052	23,957	852	24,177	191
* Tallmon Dairy	532	23,776	848	24,034	216
* Vaz Dairy	1520	23,285	801	23,059	209
* Break-Away Dairy	1333	22,392	738	21,651	216
Desperado Dairy	1465	22,072	826	22,940	220
* High Plains Dairy	1679	21,973	774	22,054	213
Just Fine Dairy	294	21,838	813	22,628	201
* Wayne Palla Dairy	3544	21,523	795	22,200	187
Baca Linda Dairy	1279	21,491	780	21,943	196

*3X a day milking

[b] Average Milk & Fat figure may be different from monthly herd summary; figures used are last day/mo.

ARIZONA & NEW MEXICO HERD IMPROVEMENT SUMMARY FOR OFFICIAL HERDS TESTED APRIL, 2002

		ARIZONA	NEW MEXICO
1.	Number of Herds	50	31
2	Total Cows in Herd	79,775	49,269
3.	Average Herd Size	1,595	1,589
4.	Percent Days in Milk	92	87
5.	Average Days in Milk	200	197
6.	Average Milk - All Cows Per Day	67.1	59.5
7.	Average Percent Fat - All Cows	3.6	3.7
8.	Total Cows in Milk	73,393	44,581
9.	Average Daily Milk for Milking Cows	73.4	69.1
10.	Average Days in Milk 1st Breeding	85	75
11.	Average Days Open	152	150
12.	Average Calving Interval	13.9	13.9
13.	Percent Somatic Cell - Linear 0-4	84	78
14.	Percent Somatic Cell - Linear 5-6	9	14
15.	Percent Somatic Cell - Linear 7 & above	7	6
16.	Average Previous Days Dry	64	68
17.	Percent Cows Leaving Herd	31	34
	**********	********	*********
			STATE AVERAGE
	MILK	21,652	21,718
Percent Butterfat		3.6	3.6
Percent Protein		3.0	3.0
Lbs. Fat		778	783
Lbs. Protein		650	638

ARIZONA COOPERATIVE EXTENSION
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THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA 85721

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