# Marketing Cows for Increased Profitability

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Dairy producers do an excellent job of producing high quality milk. Unfortunately, the same cannot always be said about the dairymen's contribution to the beef supply each year through elimination of market (cull) cows and bulls. 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., 1994b). A 2000 study, conducted by the Food Safety and Inspection Service (FSIS) of the United States Department of Agriculture (USDA), reported that dairy cattle represented over 50% of cattle harvested in 43% of the nation's largest slaughter plants (FSIS-USDA, 2000). Sales of market cows from the dairy equals approximately 5%, and can represent as much as 15%, of total income of the dairy (Dairy Beef, 2002).

A popular misconception of producers is that the majority of beef from cows and bulls is used solely for ground beef; therefore, it is thought that proper handling and the timely marketing of dairy cattle is of less concern. Producers should realize that beef cuts from cows and bulls are fabricated and sold to supermarket and food service operators. Furthermore, beef from cows and bulls may be used as entrée items in family steakhouses, on airlines, sliced beef sandwiches in fast-food establishments, and "quick-to-fix" supermarket beef items (for example, fajitas).

Production efficiency must be high for dairy producers to make a profit. Several compounds have been developed in recent years that are capable of increasing milk production, as well as reproductive efficiency. Proper administration of injectable products need not be compromised for the sake of convenience. Producers must remember to administer products subcutaneously, if possible. Conservatively, it is estimated a healthy dairy cow can receive between 25 to 30 injections per lactation (includes bovine somatotropin, reproductive hormones, and vaccination injections). With that number of injections per lactation, there are several possibilities for injection-site lesions, and therefore, lost beef product. Most injections are administered in the proper manner (subcutaneously) and location (neck region). However, the idea that "sometimes it's just easier to administer injections in the round or hip" should be discouraged. Also, it is important to remember that injection-site lesions have been identified at the processing plant 12 to 13 months post-injection.

In the National Cattlemen's Beef Association's Non-Fed Beef Report, Smith et al. (1994a) noted producers were losing $69.90/head from culled cows in 1994, and in 1999, the loss was $68.82/head (Roeber et al., 2001). It was suggested that as much as $27.50/head could be recuperated if cull cows were fed a high-energy diet prior to being shipped for harvesting (Roeber et al., 2001).

## Antibiotic Usage and Residue Violation

Food safety is an important issue for the dairy industry. Antibiotics have significantly improved the health and production efficiency of food-producing animals; however, consumer concern exists in relation to bacterial resistance in humans from products consumed from food-producing animals administered antibiotics. The resistance of bacteria to antibiotics has been shown to alter the dynamics of the flora in the human intestinal tract.

Dairy cows and veal calves are the two classes of cattle with the greatest violation of antibiotic residues according to the USDA National Residue Monitoring program. Colorado State University researchers reported 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 beef industry representatives surveyed in the 2001 National Market Cow and Bull Quality Audit. In a 1999 FSIS study, dairy cows violated residue regulations twice as often as beef cows when using on-site rapid screening tests (FSIS-USDA, 2000). In similar studies conducted in 2000, dairy cows violated residue limits three times as often when tested using a 7-plate bioassay (FSIS-USDA, 2000).

Occurrence of antibiotic residues is usually due to an inadequate clearance time between administration and slaughter, and extra-label usage of health products. Furthermore, withdrawal time is often not the same for both meat and milk. Extra-labeled product use must be avoided unless a valid veterinarian/client/patient relationship has been established. If your farm experiences an antibiotic residue violation, your veterinarian may be your only friend and ally.

The FSIS oversees the National Residue Program (NRP) to test meat products for residue levels resulting from antibiotic administration. A survey was conducted by the FSIS to determine uniformity of residue testing in 30 slaughter plants. The 30 plants were randomly selected from the 40 highest-volume plants in the United States. In 60% (18/30) of the plants surveyed, cull dairy cows represented 20 to 72% of cattle processed daily (FSIS-USDA, 2000).

The FSIS-NRP survey reports that, at certain slaughter facilities, only "high-residue-risk" condemned cows were tested for residues, while at other locations, no testing was performed on "high-residue-risk" cows. And, in the majority of locations, cows labeled as "downers" were tested for residues. Due to insufficient time and labor, there seems to be a lack of consistency and uniformity in testing at slaughter plants nationwide.

The most common antibiotic residue testing method used in slaughter facilities is Fast Antimicrobial Screen Test (FAST), while the second most utilized method of testing is Swab Test on Premises (STOP). Implementation of FAST started in pilot plants in 1995 and STOP was first introduced in 1979. Considered an appropriate replacement for STOP, which solely detects antibiotic residues in kidney tissues, FAST detects both antibiotic and sulfonamide drug residues in kidney and liver tissues (FSIS-USDA, 1996).

Dairy producers need to implement on-farm residual testing programs (meat and milk) to avoid introducing food borne residues to consumers. However, producers are unlikely to implement Hazard Analysis of Critical Control Points (HACCP) testing programs voluntarily. Approximately only 10% of the dairy producers in the United States have volunteered to implement a 10-point Milk and Dairy Beef Quality Assurance Program to prevent antibiotic residues (Gardner, 1997). Many of the antibiotic residue worries involving the dairy industry could be decreased with proper medical record documentation, increased education, and the adaptation of national standards for milk and dairy beef (Cullor, 1997).

On-farm urine-based antibiotic tests are available to ensure only antibiotic-free animals are sent to slaughter. Important to understand is that no residue test is perfect. Commercial antibiotic tests claiming 100% sensitivity and specificity were likely performed with a limited sample size or without appropriate representation (Gardner, 1997). Furthermore, many evaluations performed in a laboratory setting typically overestimate the sensitivity and specificity of a test as compared to a more realistic field test. A test's qualitative outcome (positive or negative) will depend on the level of substance being tested (Gardner, 1997).

## Management strategies to increase profitability of market cows

University 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 average daily gain was most efficient in market cows fed corn and corn by-products for 29 to 56 days. Similarly, researchers at Colorado State University (Schnell et al., 1997) found market cows were significantly less efficient during the first 14 days on feed. Averaged daily gains increased linearly from 28 to 56 days in market dairy and beef cows (Schnell et al., 1997). Fat color (white versus yellow fat) whitened within 28 days of feeding (dairy breeds used in this study exhibited the whitest fat over that of the beef breeds). White fat has been associated with increased consumer acceptance and more palatable steaks (Schnell et al., 1997). 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 has been reported to decrease bruising associated with transport (Smith et al., 1994b).

Seasonality also is an important aspect of increasing profitability of market cows. Figures from the USDA over the past 10 years suggest that the time at which cows are sold will affect the price dairy producers will receive for their cows. Prices generally are lowest during the months of November and December while the highest prices received are during March, April, and May (Figure 1). The main reason for reduced prices in the fall months are attributed to the sale of culled beef cows after weaning calves. Maintaining and feeding market dairy cows until the spring months should increase profit from the sale of market dairy cows.

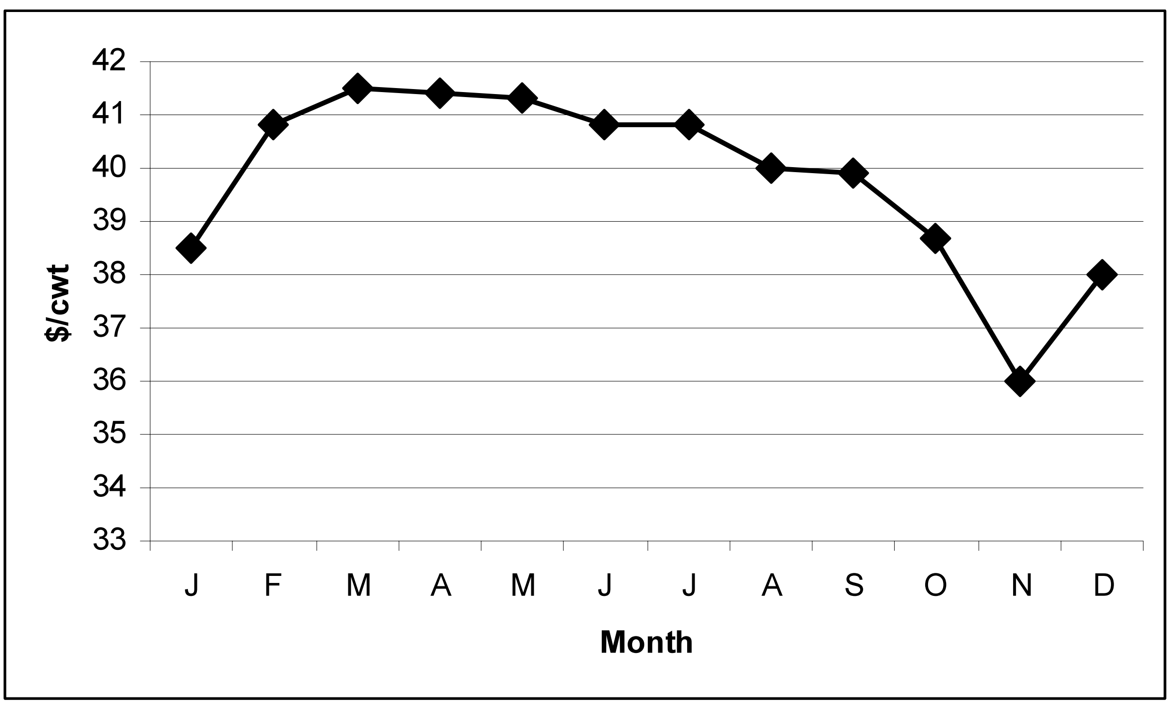


Figure 1. Selling price of market cows during the previous 10 years by month. Source: USDA/AMS, 1991-2001.

## Additional feeding of market cows research

During 2001-2002, we (Rogers et al., 2002) conducted a two-phase study, funded by the National Cattlemen's Beef Association with Beef Check-Off dollars, to identify management strategies to decrease antibiotic residue violations and increase carcass merit in market dairy cows. Specifically, our objectives were to determine the influence of additional feeding (30 or 60 days) of market dairy cows on carcass quality and to determine antibiotic meat withdrawal in dairy cows.

In phase I, 77 non-lactating Holstein market cows that were to be sold for a variety of reasons (milk production, reproduction, disease/disorders) were obtained from four commercial dairies and assigned to a control group (no additional days of feeding) or to one of two feeding treatments (30 or 60 days of additional feeding).

Prior to the experimental feeding period, all cows were weighed, assigned a body condition score (BCS) of 1 to 5, where 1 = thin and 5 = obese (Wildman et al., 1982). Additionally fed cows were administered an oral probiotic gel paste (30 g; RXV-BP-1 Bovine, AGRIpharm®, Grapevine, TX) which contained a bovine specific mixture of bacteria. Furthermore, additionally fed cows were treated intramammary with cephapirin sodium (ToDAY®, Fort Dodge Animal Health, Fort Dodge, IA).

Using commodities commonly found on Southwest dairies, a total mixed ration (TMR) was formulated. The TMR consisted of 60% high-energy concentrate and 40% quality alfalfa hay (Table 1). Cows were fed the TMR twice daily. Bunks were visually evaluated prior to feeding and the amount of feed was adjusted for pen intake. Weigh-backs were recorded on a weekly basis.

Cows used as the control (0 days of additional feed) were transported to Lonestar Packing (San Angelo, TX) from local dairies at the same time as additionally fed cows. Carcass data was collected and included hot carcass weight (HCW), ribeye area (REA), percent kidney, pelvic, heart fat (%KPH), 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.

In phase II, unhealthy (predominately medicated for mastitis) dairy cows (n = 62) were administered penicillin G procaine (Pfi-Pen G; Pfizer Animal Health, New York, NY; 1 mL/100 lbs BW, i.m.; 10 day meat withdrawal) and urine was collected and tested with a β-lactam specific enzyme-linked immunosorbent assay (ELISA; 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 the commercial antibiotic test.

**Results for Phase I.** Feed intake did not differ between feeding treatments (average = 39 lb/day per cow). Body condition scores increased in cows fed for 60 days (BCS = 3.2) compared to cows fed for 30 days (BCS = 2.8; Table 2). Average daily gain was greater in cows fed for 30 days (3.1 lb/day) than cows fed for 60 days (2 lb/day). This illustrates the feeding efficiency of cows during the early time of additional feeding (between 30 and 60 days) as shown in previous university research.

Additional feeding did not influence any carcass characteristics studied except percent KPH, which was different among feeding groups (Table 3). Hot carcass weights, marbling scores, ribeye area, and backfat were all similar among treatments. Likewise, fat color did not differ between treatments.

Incidence of condemnation was 8.3, 10, and 0% for control (0 days of additional feeding), 30 and 60 days of additional feeding, respectively. Condemnations resulted from various conditions (for example, lymphoma, septicemia, and pyemia) and were not the result of antibiotic residues. Although not statistically significant, additional feeding decreased the incidence of carcass condemnation.

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

| | |
|---|---|
| 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 days.

| | Treatment | | |
|---|---|---|---|
| Trait | 0 d | 30 d | 60 d |
| Pre-BCS | --- | 2.2 | 2.6 |
| Post-BCS | 2.6 | 2.8 | 3.2 |
| ADG (lb) | -- | 3.1[a] | 2.0[b] |

[a,b] Statistically different ($P < 0.05$).

Table 3. Hot carcass weight (HCW), ribeye area (REA), percent kidney, heart and pelvic fat (% KPH), fat thickness and fat color of carcasses from market dairy cows fed 0, 30, or 60 days.

| | Treatment | | |
|---|---|---|---|
| Trait | 0 d | 30 d | 60 d |
| HCW (lb) | 625 | 603 | 651 |
| REA (in$^2$) | 12.2 | 12.5 | 12.1 |
| % KPH | 1.6$^b$ | 1.0$^b$ | 2.1$^a$ |
| Fat thickness (in) | 0.13 | 0.10 | 0.13 |
| Fat color[c] | 0.52 | 0.19 | 0.39 |

[a,b] Statistically different ($P < 0.05$).
[c]Using a 5-point scale for visual appearance of yellow fat (0 = none to 4 = severe).

**Results from Phase II.** Thirty-one percent of cows (19/62) treated with penicillin G procaine exceeded the 10 day label withdrawal recommendation by an average of 3.1 days (range 1 to 8 days; Figure 2). As with most dairy operations, cows were not weighed prior to medication. Therefore, the actual weight of the cow to determine the precise dosage of penicillin needed was unknown at the time of treatment. Unhealthy cows will likely have reduced feed intake and water. Furthermore, metabolism is probably decreased in unhealthy cows and may partially explain why 31% of cows treated with penicillin G procaine exceeded the label withdrawal period.

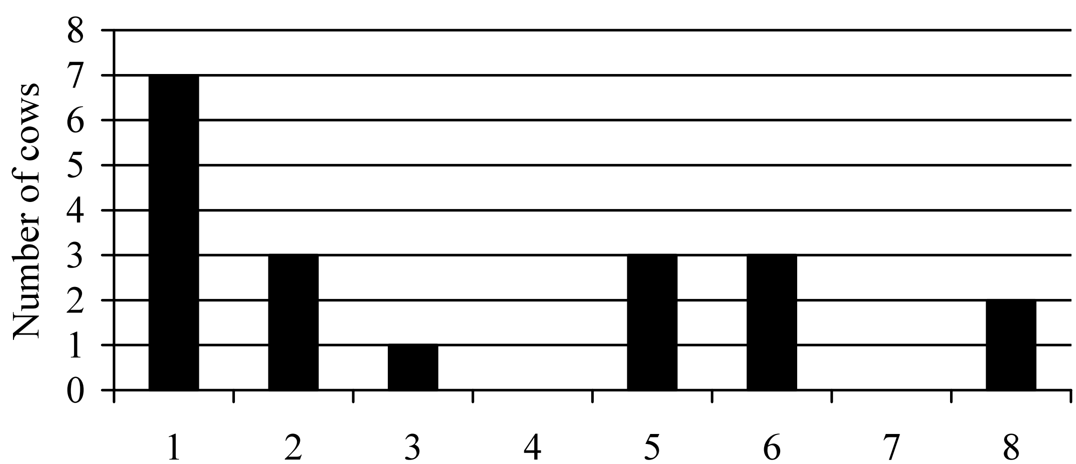


Figure 2. Number of cows exceeding 10-day withdrawal of penicillin G procaine.

Results of our research study suggests feeding market cows can increase body condition (fat cover), average daily gain 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.

## Take Home Messages

- Dairy producers are beef producers.

- Prudent use of antibiotics is of utmost importance.
    - Record keeping of all cows receiving medications.
    - Veterinarian/client/patient relationship is necessary.

- Profit can be increased from the sale of market (cull) dairy cows.
    - Seasonality is important; spring is better.
    - Additional feeding for 30 to 60 days (most efficient) when feed costs are minimized.

- Not all market cows are "candidates" for retaining and additional feeding.
- Health of animal plays a major role.
    - Some cows should be euthanized on-farm.
    - Some cows should be sold locally in a timely manner.
    - Some cows can be fed efficiently for 30 to 60 days.

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