THE REAL COSTS OF DIGESTIVE UPSET

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"Digestive upset" is a very broad category of disorders that includes a variety of diet-related gastrointestinal problems that afflict cattle (Table 1). The major causes of digestive upset in our dairy herds tend to relate back to ruminal acidosis, and possibly mycotoxin contamination of feeds. Mycotoxins may be present in feeds grown and stored on farm, or in purchased feeds. Cows are prone to suffer ruminal acidosis largely due to management issues: 1) not enough physically effective fiber is fed to encourage rumination and good rumen function, 2) a great amount of non-structural carbohydrates (particularly starch) is fed, or 3) feeding management encourages slug feeding, so that cows consume large quantities of grain at each meal. Whatever the causes of the disorder, digestive upset can result in lost milk production, increased culling, lost production due to early dry-off, increased medical costs, and increased labor costs, among other increased expenses or decreased revenues. The health problems also typically take the time of the best "cow smart" employees, rather than allowing them to devote their efforts to other improvements in the herd. Additionally, current health problems such as ruminal acidosis may be the root of future laminitis problems. The cost of digestive upset to a dairy is much greater than the medical costs of treating a sick cow.

Table 1. Partial list of disorders/conditions commonly classified as digestive upset.

Ruminal acidosis (clinical)	Constipation
Ruminal acidosis (subclinical)	Sand impaction
Displaced abomasum	Scours / diarrhea
Rumen stasis	Off-feed cows
Abomasal ulcers	Indigestion

Digestive Upset Cost Study

Although there is agreement that digestive upset results in increased costs or revenue losses, it can be difficult to determine actual dollar amounts. Working with a cooperating dairy farm, we carried out a study to determine the increased costs or revenue losses associated with each diagnosed case of digestive upset. Information was collected from May 14, 1999 through July 4, 1999 during a period in which the herd experienced an increased incidence of ration-related digestive upset. Cows were diagnosed with digestive upset by the herd health crew on the basis of a milk deviation of greater than or equal to 25%, followed by examination and direct diagnosis of the illness. For each cow diagnosed with digestive upset between May 19 and June 19, the diagnosis, date of diagnosis, days in milk, lactation number, medical treatments, and treatment costs were recorded, as was each cow's daily milk production. Only cows with more than 30 days in milk were included in the study because of difficulties predicting production for calculating milk loss early in lactation. Records were collected on 164 cows.

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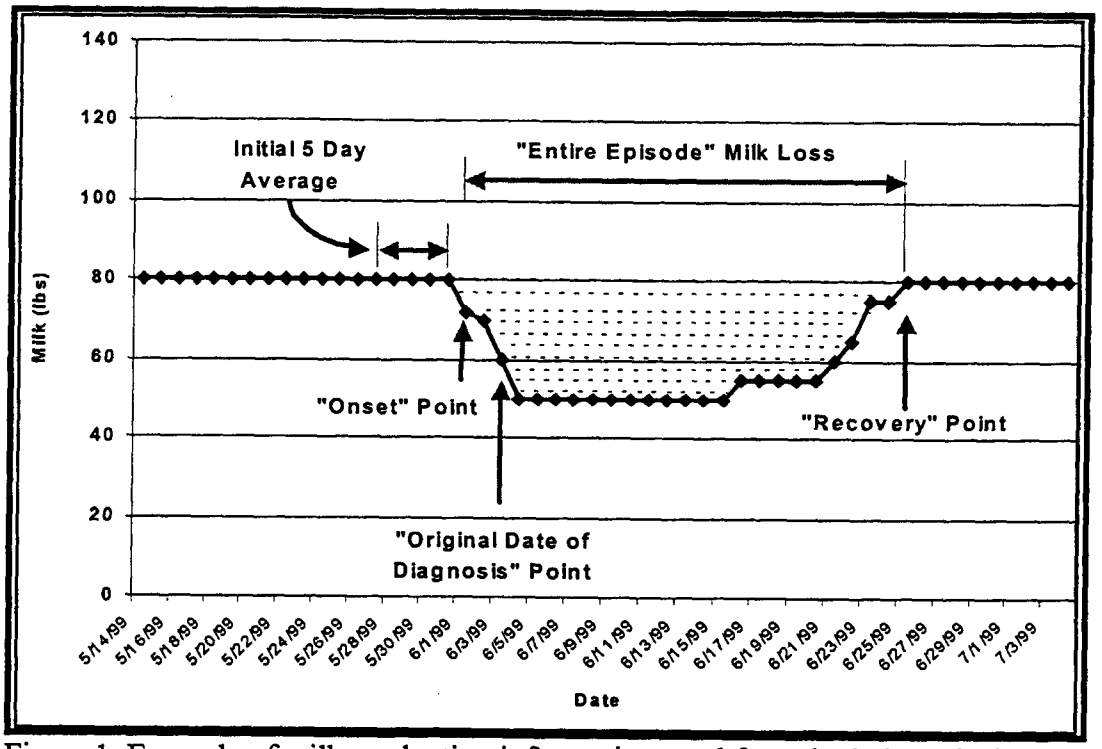
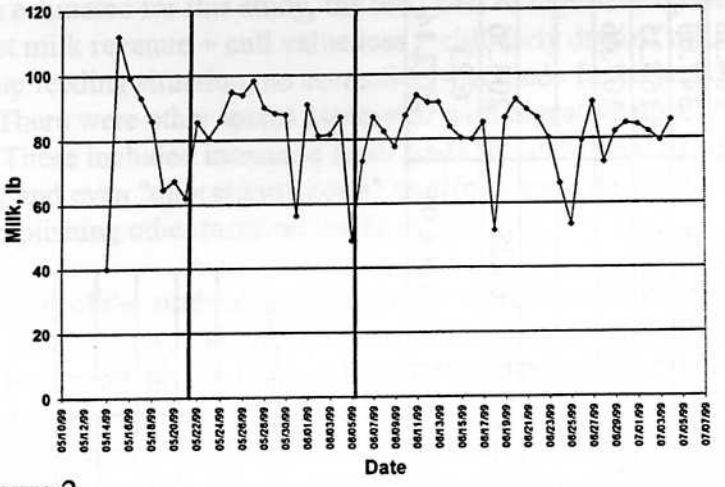


Figure 1. Example of milk production information used for calculation of milk loss, and total days in digestive upset episode.

To calculate the number of pounds of milk "lost", or more accurately, milk that was never produced, daily milk production for each cow was graphed (Figure 1). Milk weights from each milking were reviewed to verify that decreases in daily production were not due to missing milk weights. Milk loss often began approximately 3 days prior to diagnosis of digestive upset. The onset of milk loss and of the digestive upset episode was determined to be the point at which milk production was 10% less than the previous 5-day average. The milk production was termed "recovered" and the episode ended when a cow's daily production returned to within 10% of the initial 5-day average. The length of a milk loss episode encompassed the period when milk production was at least 10% less than the initial 5 day average. Total milk loss was the sum of the initial 5 day average minus the daily milk weight for each day in the entire episode. Milk was given a value of $15.50 / cwt. Production curves for some of the cows on the trial are shown (Figures 2 - 4).

Cows that exit the milking herd due to early dry-off, culling, or death present additional losses. In this study, 21 animals diagnosed with digestive upset exited the milking herd, but there were no deaths. For animals that were culled, a value of $1,100 per head was assigned. For a cull animal, the loss in value was the $1,100 minus the revenue received from her sale. The loss in value for an animal that died would be the entire $1,100. For animals that were dried off before 305 days in milk, a projection was made of the amount of milk that they would have produced between the actual date of dry off and 305 days. It was predicted that production would decrease 10% in the first 30 days, and an additional 5% (e.g., 85%, 80%, 75% etc.) from the initial milk production in each subsequent 30 day period through 305 days (D. Webb, personal communication). This milk not produced was counted as a revenue loss.



Vertical lines indicate date of digestive upset diagnosis. These milk production curves are typical of the performance of animals diagnosed with digestive upset.

Figure 2.

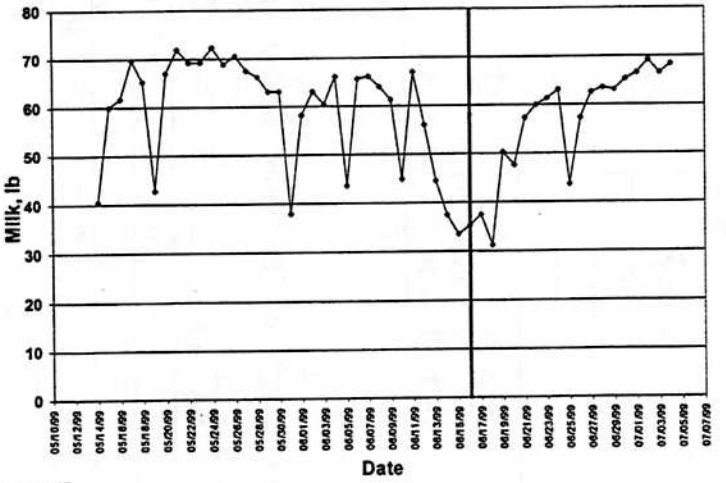


Figure 3.

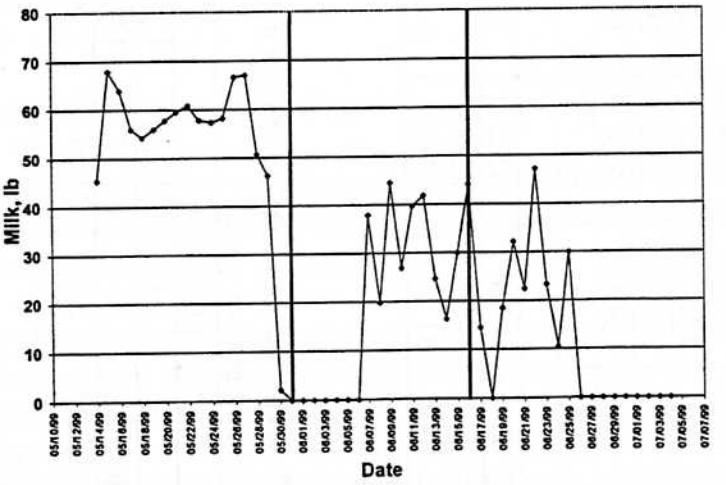


Figure 5. Example production curve of a cow that was dried off before 305 days.

Table 2. Average values for production losses and costs related to digestive upset in a lactating cow study.

Number of cows	Lact #.	Days in Milk	Initial Milk, lb	Total Days in Episode	Total Milk Deviation, lb	Lost Milk Revenue, $	Treatment Cost, $	Cull Value Loss, $	Early Culling / Dry Off Cost, $	Total Cost / Lost Revenue, $
By Lactation Number										
66	1	238	70.2	25.9	582.3	90.26	5.46	10.19	17.25	123.15
41	2	227	75.7	29.5	993.8	154.03	5.01	16.40	93.17	268.61
57	3+	217	80.6	25.7	767.7	118.99	6.19	43.42	95.07	263.69
By Days In Milk										
24	3.4	30-100	81.4	25.4	569.9	88.34	13.34	28.01	54.89	184.58
49	2.4	101-200	80.7	30.1	947.4	146.85	5.95	39.19	155.04	347.03
52	2.0	201-300	73.0	29.4	860.7	133.40	2.81	0	28.14	164.35
39	2.5	301+	67.4	19.9	463.6	71.86	4.12	31.48	0	107.46
Average										
164	2.4	228	75.2	26.9	749.6	116.19	5.60	23.29	63.28	208.36
Ranges	1 - 8	31 - 731	42.8 - 114.9	2 - 48	40.2 - 3225.3	6.23 - 499.93	0 - 74.22	0 - 672.39	0 - 1904.95	6.23 - 2872.14

Table 3. Cows by lactation number or days in milk as a percentage of the entire milking herd or of the animals diagnosed with digestive upset.

	Lactation			Days in Milk			
Group	1st	2nd	3rd +	41 - 100	101 - 200	201 - 305	305+
Milking Herd	36	27	37	11	27	34	18
Digestive Upset	40	25	35	10	29	30	21

As estimated for this study, the total cost of digestive upset was calculated as: treatment costs + lost milk revenue + cull value loss + cull/early dry-off milk revenue loss. Because this was a group feeding situation, no correction was made for reduced feed intake by the sick animals. There were other losses associated with digestive upset that we were unable to evaluate. These included increased labor costs for additional handling of sick animals, hospital barn costs, and even "opportunity costs" as efforts were devoted to tending sick animals, rather than accomplishing other tasks on the farm.

Results of the study showed that there were sizeable costs for each case of digestive upse (Table 2). The cost of treating the animal was usually among the lower costs/revenue losses incurred. Reduced milk revenues, whether considered from the milk loss proper, or from early exit from the milking herd, was by far the largest loss. Although the information was not statistically analyzed, it appears that the proportion of animals suffering digestive upset, was similar to that in the herd at large for lactation number and days in milk (Table 3). In other words, in this situation days in milk and lactation number did not affect the likelihood that an animal would be diagnosed with digestive upset. The problem affected the whole herd.

Milk production should typically vary no more than 1 to 5 pounds from day to day in healthy dairy cows (D. Webb, personal communication). This benchmark raises more concerns about the performance of the cows in this study. There were many 10 to 20 pound single-day decreases in milk production that were not directly associated with the diagnosis of digestive upset. One interpretation is that the feeding of a ration low in physically effective fiber to the entire herd likely resulted in subclinical acidosis affecting large portions of the herd, aside from the official diagnoses of digestive upset. The reduced rumination in the herd at the time (~30% or less of the animals chewing their cuds) and the variable manure and increased incidence of diarrhea would tend to support this idea. It is possible that the single day decreases in milk production reflect the effect of subclinical ruminal acidosis on milk production. This reinforces the idea that "pushing" grain into rations to support high milk production may instead result in cows that produce less milk, whether or not they are diagnosed as sick.

Prevention

Three key factors to preventing digestive upset in dairy cattle are:

- Consumption of adequate physically effective fiber
- Not overloading the rumen with readily degraded carbohydrates -- especially starches
- Feeding mycotoxin - clean feeds.

Physically effective fiber enhances rumination and rumen function. With the proper amount and type of fiber included in the diet, not only will animals suffer less digestive upset, they will better digest and utilize all of the feeds they consume. Not only does adequate fiber have to be included in the ration, but the cows have to actually eat it. Especially in warm weather, cows will tend to consume concentrates and sort out forages, particularly coarse, unpalatable, dusty, stemmy, or weedy forages. A minimum of approximately 40% roughage (including cottonseed

hulls) in the ration is recommended. The bottom line is to include enough appropriate quality fiber in the rations to keep the animals healthy, and make sure they consume it.

Even with adequate fiber, the ration also needs to be managed so that feed and water are consistently and continuously available. Such management can help to avoid the "dosing" of large amounts of grain into the rumen that comes with slug feeding.

Summary

Caution should be used when trying to extend this data beyond the farm in the study. In this particular herd, limitations to forage feeding relative to concentrate feeding appeared to be the driving force behind the upsets. In cases where the problem is largely with fresh cows/dry cow management, problems with excessive non-structural carbohydrate fermentation in the rumen, other feeding management issues, or mycotoxins, the profile and severity of the problem for another herd will likely differ. Nonetheless, the study offers a method to determine the costs of digestive upset. Its results suggest that increased costs/revenue losses from digestive upset can be staggering, and come largely in the form of production never realized.

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