

Check Out the Manure: It's a Report Card on Digestion

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In ruminants, digestion of feed occurs primarily in the rumen, with some additional digestion proceeding in the abomasum, small intestine and large intestine. Manure consists primarily of feed particles that have resisted degradation throughout the entire digestive tract, and which has been expelled back into the environment. Examination of manure can provide evidence of how effective the digestive process has been, and may provide clues of opportunities to improve digestion. With dairy cows, this can lead to increased efficiency of converting feed into milk, raising total milk production and improving profit.

Efficiency of digestion depends heavily on three factors. One is the digestibility of forages. Over-mature forages with high lignin content digest very slowly or not at all. The undigested portion will be evident in manure. The second factor is moisture content and particle size of grain. Dry grain and coarsely ground grain are less digestible than wetter, finer ground material. The third factor is balancing the ration correctly to produce a rumen environment that factors retention of feed material long enough for maximum digestion to occur, along with the proper pH for microbes to function effectively.

You can evaluate manure by simply looking at it, manipulating it for texture and composition, or even washing it through screens and evaluating the material on the screens. You can also learn a great deal from simply looking at manure while walking through the barn. A normal "cow pie" is roughly eight inches in diameter and two inches high, often with a "dimple" in the center where the last bit of feces dropped. Taller piles that look dry imply long retention in the digestive tract, which in turn suggests forages are being fed that are high in fiber with low digestibility. This is normal for dry cow and heifer rations, but it is not desired in lactating rations.

Pools of watery manure suggest some digestive upset, either from an infectious disease or from acidosis. The acidosis can in turn be from excessive grain, inadequate fiber, or finely processed forages that provide little "chew factor." Bubbles in the manure imply gas formation, which could suggest fermentation is occurring in the large intestine. Fermentation this far along in the digestive tract means that nutrients were not digested earlier, when they could have been absorbed and used for milk production.

Manure that appears "loose" but not watery can mean rapid passage through the digestive tract, with inadequate time for water absorption. Rapid passage can also limit digestion and absorption of nutrients. Cows on pasture, with relatively low effective fiber and perhaps high levels of soluble protein, often show loose manure. Rations balanced with high grain and/or low effective fiber also result in rapid passage.

In tie stall barns with grates over the gutters, or in free stall barns with slotted floors, additional visual information is available by noting how much manure passes through and how much stacks up on top of the grate or slots. Producers often use this as a gauge of digestive effectiveness. If things are working right, most manure will pass through.

Visual inspection of manure can sometimes reveal undigested grain passing through the cow. Corn is the easiest to see, due to its color and particle size if it is coming from silage. Opportunities for improvement by using a kernel processor or grinding corn finer are often noted by the amount of grain seen in manure. It is more difficult to detect small grains, soybeans, or cottonseed by casual observation. This is also true for undigested fiber.

Veterinarians who perform rectal exams routinely are able to do a very close examination of manure. Often the cows being palpated are those in early lactation, when efficient digestion is most important. I recall that the manure in high-producing herds contained very little undigested feed.

Dairy manure may occasionally contain mucous, which is produced by the cells that line the intestine in response to inflammation. The mucus may coagulate into “casts” several inches long that replicate the internal surface of the bowel. If significant amounts of mucous or mucous casts exist in a group of cows, acidosis may be present.

If manure appears inconsistent, with some stiff, some watery, and some normal, this implies that cows are actually consuming different rations. This occurs when some cows are sorting the TMR. Cycles of acidosis can also lead to inconsistent manure. Cows with acidosis initially put out watery manure, then they reduce feed intake, their manure stiffens, they come back on feed, and manure returns to normal. If the ration is conducive to acidosis, this cycle continues.

Although it will not likely be obvious just from walking through a group of cows, the total volume of manure goes up when digestibility goes down. I recall a producer who milked around 800 cows, where a manure separator was employed to remove and segregate solids from the manure. The solids were then hauled to a different location to be stored until they were applied to fields. A time came when this producer finished the corn silage from one crop year and started the new crop. Almost immediately, he noted that feed intake increased, milk production rose significantly, and the amount of solids to haul away dropped by roughly 20%. The implication is that more of the new corn silage was digested and converted into milk, thus less was excreted to be hauled away.

Most of us tend to think of manure as a problem, making a mess of things and taking a lot of effort to haul away. But it can also give us information about how feed is being digested, so pay attention to what it is telling you.

