Classic Assumptions about Marketing & Manufacturing Dried Class A Sludge Can Hike Process Costs Unnecessarily

By Joseph H. Herndon

Packaged, pelletized, and merchandized in beautiful retail-sized bags, similar to bags of chemical fertilizer: This would be an apt description of the original vision of sludge going to market.

In the not-so-distant past, it was thought that dried Class A sludge was most likely to be sold in the quintessential 50-pound bag at a home and garden store and merchandized for use in the individual yards and gardens of suburbia. That was—and perhaps still is, for some—the commonly held view for the future of Class A sludge marketing. This assumption has, in fact, turned out to be a reality in only a few circumstances.

Retail marketing of Class A sludge in small "consumer" quantities does exist—just as it was once imagined—but, as field research quickly reveals, it is becoming the exception rather than the rule. Today, and for the foreseeable future, it is far more likely that the industry's Class A sludge will ultimately go in bulk to a direct-land-applied agricultural application or to commercial service operations in the lawn-care or nursery industry.

This may seem like a small distinction, but it makes a substantive difference in the form and nature of the preferred Class A characteristics required by today's real buyers. This distinction can make a considerable difference in the size of the investment necessary for an individual utility to enter into the ranks of successful Class A manufacturers and marketers.

For years, it has been thought that the ideal form—cost aside—for dried Class A sludge was that of a small pellet approximately 4 millimeters in size. In actual use, this is an excellent size only for certain applications. In the classic view of Class A sludge marketing, the product was to be bagged for individual home use, so the pellet form provides advantages in handling and in appearance that does, in fact, benefit retail marketing. In the much more common direct-land-application uses, however, the pellet form adds little or no value to the product.

In fact, in many direct-land-application uses, the granular form of Class A sludge is preferable because the granular form—with its variation from 4 millimeters to 1 millimeter to fines—provides a dramatic increase in surface area, allowing it to deliver a portion of the nutrients and organic material it contains to the soil almost immediately. Also, the inherent variation in the granular form enhances the time-release effect of Class A sludge, as the size variances of granular sludge provide a natural "spread" in activation times. For example, the smaller fines will completely dissolve shortly after they are introduced to water, while the largest particles will dissolve over a period of weeks and months.

Joseph H. Herndon has more than 30 years of experience in the water and wastewater industry and has worked extensively with fertilizer brokers and landowners in the Southeastern United States.

Aside from the added costs of producing pellets, there are specific marketing problems common to the pelletized form of Class A sludge. Pellets are formed through a series of steps, including: mixing, heating, and screening, with fines and smaller particles being recycled through the mixing, heating, and screening cycle until they reach a specific size. This process naturally creates a layering effect—much like the layers of an onion—which in application can significantly delay the disintegration of the individual pellets. Also, it is possible for binding compounds used in a pelletizing operation to delay the pellets reaction with water.

In combination, these factors of pellet manufacturing can delay pellet disintegration up to two years or longer. In specialized applications, such as fertilizer for golf course greens, this resistance to disintegration can be a real detriment to the marketing of Class A sludge in the pellet form. In other applications, such as agricultural soil-building, the pellet form of the sludge may be of little or no importance.

Interestingly, the agriculture industry has come to prize Class A sludge—in any form—for the organic material it naturally supplies, in addition to its inherent nutrient value. Chemical fertilizer provides only nutrients and does little to augment the organic content of the soil. For this reason,

-Table 1

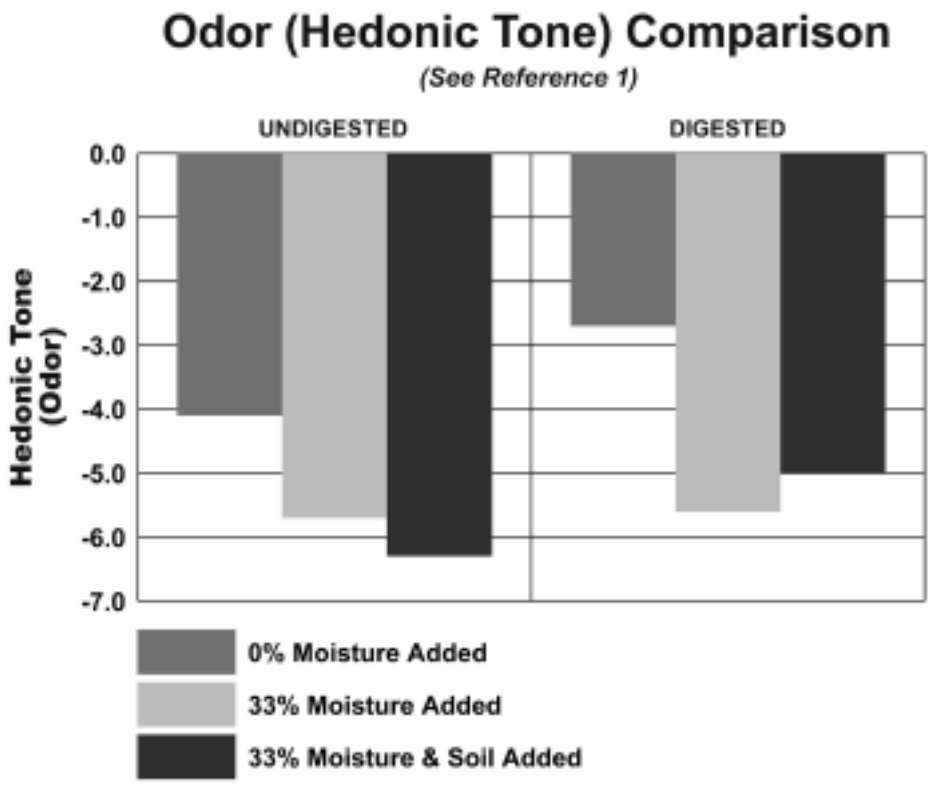
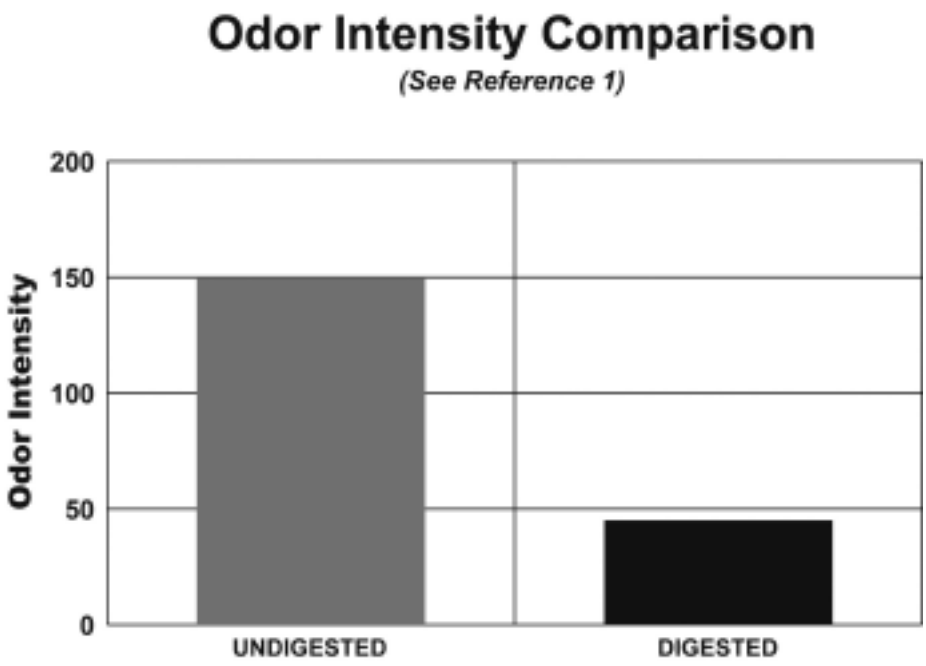


Table 2



several commercial fertilizer suppliers to the agricultural industry mix Class A sludge with their chemical fertilizer to create a more complete, more beneficial product.

Digestion's Odor-Reducing Benefits May Be Overrated or Irrelevant In Many Applications.

Digestion has been thought to be an essential in the production of marketable Class A sludge. This assumption, as some in the industry have learned, may not necessarily be true.

The impetus for the digestion of sludge prior to drying has been to reduce the odor of the end product, both when it is dry and when it is moist. Obviously, odor issues are important to individual users such as homeowners; however, they are of less importance to large agricultural users.

Quantifying the benefits derived from the digestion process related to Class A production is an especially important issue for most utilities because the capital cost of digestion equipment is significant. For smaller wastewater facilities, it can literally mean the difference between processing and not processing Class A sludge. The lesson may be: If you are not already in a position to digest your sludge prior to drying, it may not be cost-effective or necessary to do so.

In a recent study1, the odor (i.e., bad smell or hedonic tone), intensity of smell, and persistence were compared between undigested and digested Class A sludge—both in the dry and moist state. In this carefully executed study, the undigested sludge garnered a bad smell value of –4.1, while the digested sludge achieved a level of –2.7 (see Tab;e 1). In the same study, the intensity of the odor varied from 150 for the undigested samples to 45 for the digested samples (see Table 2). Further, the persistence level of the undigested sludge was ranked at –0.45 versus –0.30 (see Table 3).

The undigested sludge was characterized using the words sour, decay, rancid, and earthy. The digested sludge was characterized using the words earthy, decay, burnt and stale.

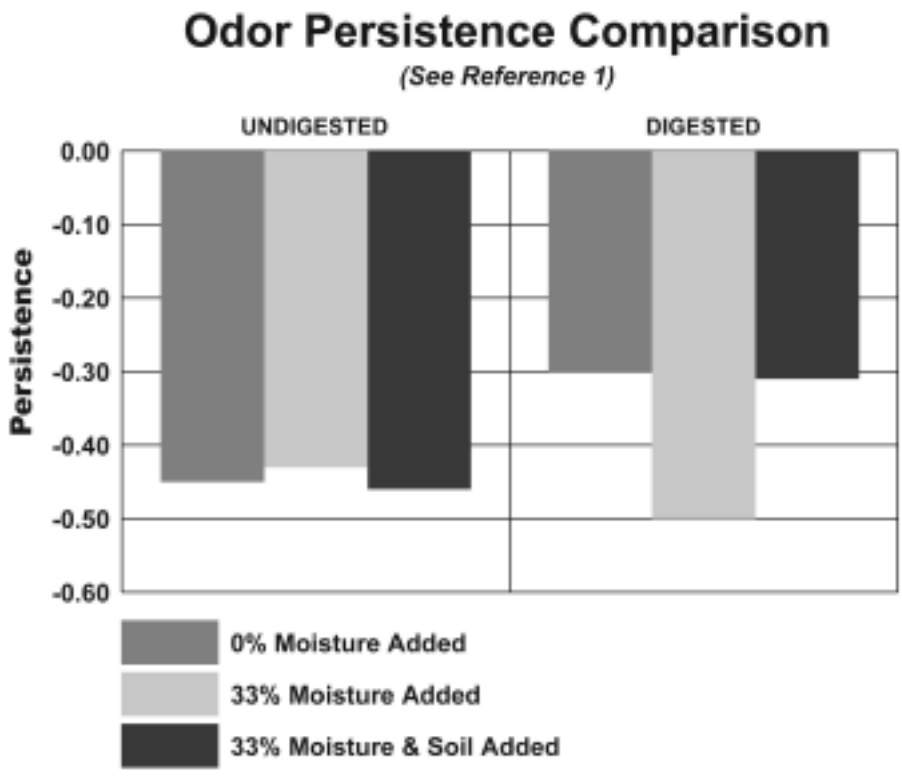
When moist (33 percent moisture added), the undigested sludge scored a hedonic tone of –5.7 and digested sludge scored a hedonic tone of –5.6. The moist undigested sludge was described with the words earthy, garbage, sour, and decay. The digested sludge was described with the words garbage, sour, earthy, and burnt. Under these moist conditions, it is easy to see that the samples had near the same characteristics of odor.

It is notable that when the samples were inoculated with soil, differences again surfaced. After 24 hours with soil, the undigested sludge registered a hedonic tone of –6.3, and the digested sludge registered a hedonic tone of –5.0. The undigested sludge had a persistence level of –0.46, and the digested sludge had a persistence level of –0.31. At this point, the undigested sludge was described with the words earthy, rancid, garbage, and sour. The digested sludge, likewise, was described with the words vegetable, sour, burnt, and earthy.

The results of this study indicate that the difference in odor, intensity, and persistence between undigested and digested Class A sludge is measurable, but in some cases by quite a small margin. Does this mean that

Continued on page 44

Table 3



Continued from page 43

all sludge should be digested prior to drying? Probably not, but the study, along with direct field experience, indicates that digestion is not the "essential" that it was once thought to be.

Shift to Class A Production May Be Less Costly than Previously Assumed

As with most things, experience has shown that "absolutes" are eventually exposed and that when a Class A sludge production facility is being planned, there are no automatic answers. Certainly, it is important to consider the real markets for the product—which exist virtually everywhere—and to make the process decisions based on the specific needs of an identified end-user or buyer.

It may, in fact, be unnecessary to go to the expense of pelletizing your Class A product; it could even turn out to be a detriment for specific end-users. It may also be unnecessary to add digestion equipment—if these facilities do not already exist—to your process to successfully market your Class A product. You may be able to move to the marketing of such a product sooner and at less expense than you previously thought.

Class A Sludge Demand Is Growing Rapidly

The promise of sludge reuse has begun to blossom fully after years and years of evolution toward the ideal of a *totally sustainable, economically sound, environmentally safe, publicly acceptable* large-scale, waste-to-product cycle. Along the way, all parties have been guilty of creating "absolutes" that now, in practice, are proving to be nothing more than widely-held misconceptions. Some of these misconceptions have reached almost mythical proportion and some have been accepted almost as common knowledge, without question. Now, as Class A sludge truly begins to find its place in the fertilizer industry, it is time to take a fresh look at your individual sludge options and seriously consider moving to the production of a Class A sludge product.

Reference

[1] *Sudhir Murthy; Hyunook Kim; Christopher Peot; Laura McConnell; Mary Strawn; Thomas Sadick; Ivan Dolak (2003) Evaluation of Odor Characteristics of Heat-dried Biosolids Product; Water Environment Research Vol. 75, No. 6; Water Environment Federation: Alexandria, Virgina.*