ANAEROBIC DIGESTION

Anaerobic digestion is the process by which organic materials are decomposed by micro-organisms in an airtight vessel. This process produces biogas, a green energy fuel used to operate a generator that in turn generates energy used either on or off the farm. An anaerobic digester (AD) is the large liquid-containing vessel in which the organic material is heated and exposed to bacteria.

In general, a farm will need several economic drivers to build an AD system. Most systems are built to produce electricity from the biogas to sell back to the provincial electricity grid. On a livestock farm, if the AD system is already in place and has a sustainable input recipe (including manure, other agricultural or food by-products), then the addition of some deadstock material may make sense.

The biogas produced by anaerobic digestion units can be burned for heat or used to generate electricity.

There are few if any AD systems designed to manage large quantities of deadstock, although technically such a system could be viable. On-farm AD systems do often manage other meat-based by-products in limited quantities relative to the amount of manure typically added. Experience from adding meat by-products can be useful in considering digestion of deadstock.

A key technical consideration to adding deadstock to an on-farm AD will be particle-size reduction to ensure that the organic material is fully accessible to the anaerobic bacteria, and to minimize risk of plugging pumps and pipes. Pre-processing to a size of less than 2.5 cm (1 in.) in diameter may be necessary before adding material to the AD system, although on-farm pre-processing may be undesirable. Even if pipes and pumps are of sufficient diameter, adding a whole carcass directly to the digester presents challenges such as length of time for bones to break down and skin that can block or damage pumps or pipes.

Another key consideration will be the digester's biological ability to accept regular or irregular additions of energy-rich meat products like a carcass. Keeping the quantity of deadstock material limited relative to the total quantity of inputs will minimize the risk of an upset to the biological process. Establishing a digester to handle primarily deadstock would require a high level of design expertise and a superior biological monitoring program to ensure effective design and operation of the system.

Size reduction is important. Otherwise, vectors such as dogs, skunks and vultures may be drawn to the excess meaty material.

Receiving deadstock from neighbouring facilities may be technically viable and present an economic opportunity. Again, careful design, operation, and material security will be necessary. Unlike a common reception bin for deadstock located near the road, typically an AD is located near the barn and is connected through various pipes or equipment to the barn – increasing the risk of biosecurity breakdowns. In addition, by receiving deadstock from neighbouring facilities, the total quantity of meaty carcass inputs rises relative to the manure inputs, increasing the risk of biological upset. Receiving large quantities of deadstock related to a catastrophic event is not recommended in a conventional farm-based AD system.

There are several considerations to managing the digestate (the liquid end-product) from a digester receiving deadstock. Cattle-derived digestate should not leave the farm property due to concerns relating to BSE and specified risk material (SRM) from the carcass material. If such movement is to occur, a federal permit is required. Size reduction is important, without which the excess meaty material may attract vectors. The use of a solid-liquid separator and post-composting and curing of solid digestate material may reduce such a risk.