What makes a good slurry?

When it comes to storage and application, what makes a good slurry is easy to define. But when optimal soil and plant health are the focus, the answer is much more complicated.

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What makes a good slurry is determined by and depends on each dairy unit's circumstances and what producers want from it. SoilSense's Elaine Jewkes says that the difficulty in answering the question stems from the inherent variability both in slurry and in soils.

"Each unit's particular dairy system dictates what kind of slurry is made and how producers should use it," she says. "There's likely to be land with high indices that shouldn't have any more slurry applied to it, as well as lower nutrient fields that would really benefit from slurry applications, as well as everything in between."

Mrs Jewkes stresses that good slurry management is situation-specific and starts with soil and, ideally, slurry analyses. The results inform nutrient plans that take into account the purpose and management of crops – whether that's grass for grazing, or silage and/or feed crops.

"One of my clients, for example, has a predominantly housed herd and benefits from slurry separation, which helps with nutrient utilisation," she says. "This allows them to make multiple applications of liquid to support the nutrient requirements for between three and four cuts of silage, without exceeding NVZ limits. They are then able to use the solid fraction on fields for wholecrop cereals. As a system, it works well."

Romney Jackson:
"Slurry can be an excellent food source for soil microbes"

Nutrient content

The key, she says, is matching slurry nutrient content to crop requirements as much as possible. "In systems with both tillage and grass, rotating crops and grass can be useful for managing soil nutrient indices. For example, P and K indices tend to increase with slurry use on maize, but can be hard to maintain over multiple silage cuts. So, where possible, swapping the land use from time to time makes sense."

Applying the same principal to enterprises where grassland on the farm is grazed and silage ground is

further away, is harder. But Ms Jewkes has some options. "If you have dirty water and slurry, targeting the dirty water use to the grazing may help as this land is likely to require fewer nutrients. It also enables you to use the more nutrient-dense slurry on silage leys where it will be more beneficial," she adds.

In grazing-based systems the challenge of targeting nutrients to where they are most needed is similar. Being mostly collecting yard and parlour washings, the slurry here tends to be more dilute, meaning that separation is less feasible. But with repeat use on grazed land the P and K is still likely to build so, where possible, it should be targeted to silage fields – or according to soil test results."

"Remember more isn't necessarily better. Overdosing with any nutrient isn't good and won't necessarily result in bigger yields or better feed values. In addition, grass sugar levels are inversely correlated with nitrogen, and any resulting silage can have high ammonia and butyric acid levels."

Application methods

Mrs Jewkes adds that method of application is also key to ensure slurry applications are optimised. "While injection systems minimise losses and improve nitrogen utilisation by the plant, there are many situations where it's less than ideal. Stony soils, for example, wear the injectors, and this system of application can also create slits in clay soils in drier conditions.

"A dribble bar or trailing shoe will work well in a wide variety of situations and keep the grass 'cleaner'," she adds. "A trailing shoe will place the slurry on the soil, rather than the grass, and the ley's canopy reduces ammonia losses. A dribble bar is multi-purpose and can be used on a growing crop."

With soil biology responsible for the breaking down and utilisation of slurry, applying it to the soil surface is important. As is ensuring soil is physically and chemically healthy. A high-functioning soil needs air and water, as well as a food source. By avoiding and, if necessary, addressing compaction, for example, microbes have an environment in which they can thrive.

Sylgen Animal Health's Romney Jackson says this is where there are gains to be had. "Soil biology is hugely influential when it comes to plant health and nutrition. Not only are microbes – soil bacteria and fungi – breaking down the organic matter and turning complex compounds into simpler ones that plants can better utilise, some mineralise otherwise unavailable nutrients, and play an essential role in transporting them. Microbes are also increasingly understood to have a role in stimulating plant defences against both pests and diseases," he explains.

"Slurry can be an excellent food source for these microbes and helps to build their populations. Slurry is also potentially a good source of carbon, which is vital for the survival and replication of soil microbes. Once this carbon is exhausted the microbes depend upon the carbon-rich secretions excreted from plant roots, a substance known as exudates. Plants use exudates to attract microbes and swap it for water, nutrients, hormones and enzymes.

"In contrast, synthetic NPK damages the relationships between microbes and plants. With readily-accessible nutrients, plants have no need to recruit microbes with carbon-based exudates."

Soil health: microbes need an environment where they can thrive

A 'good' slurry is, therefore, one that contains a relatively high amount of carbon, as well as sufficient nutrients for the growth of beneficial microbes when they are added.

"What we want, biologically, is something that doesn't burn the grass and brown off the plant roots. We don't know for sure what causes grass to burn, but there's some evidence to suggest it's the strong anaerobic nature of slurry that consumes the oxygen, making it unavailable to the microbiology in soils that is aerobic."

Natural microbes

"Adding certain microbes to slurry, like those in SlurryForSoil, can be helpful. They can outcompete the natural microbes found in slurry and help to break it down while it is in storage. This means the soil biology and plants can access and utilise the nutrients more quickly. And this has the added benefit of making pasture available for grazing sooner."

Microbes' potential to offer benefits during storage and application is another point of focus for Mr Jackson.

"A homogenised slurry requires less stirring and is easier to spread. A thinner, more fluid slurry will also penetrate the soil more quickly."

A reduced need for mixing has health-and-safety advantages, as well as time and fuel savings. Mixing can encourage volatilisation – the release of nitrogen – so there is also an environmental benefit.

"Sludge can be a real problem. It tends to be where the odours originate from – the volatile fatty acids," adds Mr Jackson. "While this can be reduced by stirring, the problem is that the heavy, dense material will settle again, slowly tuning into a deeply anaerobic area where only those microbes that can survive in these conditions thrive. It's another reason to harness microbes' ability to digest slurry." |