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Stephen F. Higgins

University of Kentucky, shiggins@bae.uky.edu

Kylie Schmidt


University of Kentucky, kylie.schmidt@uky.edu

Sarah Wightman

University of Kentucky, sarah.wightman@uky.edu

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Lowering Somatic Cell Count with Best Management Practices

Steve Higgins, Kylie Schmidt, and Sarah Wightman, Biosystems and Agricultural Engineering

As health and food safety concerns grow, dairy producers are facing more stringent regulations. In 2010, the European Union (EU) set the somatic cell count (SCC) upper limit, an indicator of milk quality, for exported milk at 400,000 cells per milliliter. However, the current U.S. SCC limit is 750,000 cells per milliliter. As of January 2012, any U.S. milk used in export markets must meet the EU standards. It is projected that US milk processors will gradually adopt the EU upper limit, making it difficult for dairy producers to sell milk containing more than 400,000 somatic cells per milliliter. Dairy producers will have to find innovative and cost-effective ways to reduce the somatic cell count of their milk. This publication will discuss how agriculture best management practices can be used to lower SCC.

Best Management Practices for Lowering SCC

Research shows that SCCs of fewer than 200,000 cells per milliliter can be obtained if producers pay attention to production details by adopting the following management practices:

- Keeping cows clean (managing mud, manure, and runoff)
- Milking clean, dry teats
- Wearing gloves
- Pre-dipping
- Drying cows with individual towels
- Post-dipping
- Revising prep-lag time
- Culturing high-SCC cows
- Culling chronically high-SCC cows
- Conducting equipment checks
- Treating dry cows
- Using a coliform mastitis vaccine

Best management practices (BMPs) used to manage mud, manure, and runoff (keeping cows clean) in a producer's agriculture water quality plan (AWQP) are also effective tools for lowering SCC. This publication discusses several BMPs that will help dairy producers become more competitive in a changing global market and remain compliant with state regulations while improving herd health and increasing profits.

Managing Mud, Manure, and Runoff

If the milking herd or dry livestock lie in mud, manure, or wet bedding, teat ends will be exposed to infectious pathogens, which can cause mastitis and thus increase SCC. Keeping cows dry and clean by using the following BMPs to manage mud, manure, and runoff will help lower SCC.

Pasture Practices

The cheapest way to manage mud within a pasture is to maintain a sufficient amount of vegetation to hold the soil in place. This practice is difficult to accomplish in a pasture that is grazed continuously or is overstocked. Overgrazing and overstocking pastures leads to suboptimal forage regrowth and quality, compacted soil, and an abundance of manure.

Cattle avoid eating plants that are contaminated by excreta, so allowing buildup of urine and manure in resting areas reduces forage quality and palatability. However, cattle are generally indifferent to walking or lying in patches of excreta within pastures, which can increase the chances of udder infection.

Rotational grazing and a proper stocking density can provide adequate vegetation on which cows can rest and graze.

A rotational grazing system consists of multiple small pastures where each has access to a clean water source that is no farther than 600 feet away. Rotating cattle between pastures provides adequate regrowth periods and abundant forage for grazing cattle. For more information on rotational grazing, see the University of Kentucky Cooperative Extension publication *Rotational Grazing* (ID-143). For determining an appropriate stocking density, see the University of Kentucky Cooperative Extension publication *Using a Grazing Stick for Pasture Management* (AGR-191).

Dry Lots and Winter Feeding Areas

When stocking density cannot be adequately controlled or controlling mud is an issue, dry lots, winter feeding structures, or roofed confinement areas should be used in the winter months to prevent erosion, protect cows from harsh winds, and get cows out of the mud. These areas, unlike "sacrifice areas," use all weather traffic pads to control erosion and mud (whereas sacrifice areas are eroded and denuded areas).

Dry lots and winterfeeding areas are typically constructed with geotextile fabric and compacted gravel to limit the creation of mud. However, if the manure from these areas is going to be routinely scraped, then an all weather traffic pad with grooved concrete is the better choice. Gravel is more expensive in the long run because it must be replaced after scraping manure. For more information on dry lots and winter feeding areas, see the University of Kentucky Cooperative Extension publications *Using Dry Lots to Conserve Pastures and Reduce Pollution Potential* (ID-171), *Appropriate All Weather Surfaces* (AEN-115), and *Strategic Winter Feeding of Cattle using a Rotational Grazing Structure* (ID-188).

Heavy Use Areas

Maintaining vegetation in high traffic areas such as gate openings and lanes is almost impossible. These mud-prone areas should be equipped with an appropriate all weather surface such as concrete, soil-cement, or gravel with geotextile fabric. Heavy use area pads and lanes should be installed using Natural Resource Conservation Service–designed pads consisting of geotextile fabric and rock. For more information on heavy use areas, see the University of Kentucky Cooperative Extension publication *Appropriate All Weather Surfaces for Livestock* (AEN-115) or contact the local NRCS office.

Portable Shade Structures

Shade is essential for providing relief from spring heat waves when cows still have a winter coat and from hot and humid summer conditions. Providing shade can also increase productivity while maintaining animal health. Shade trees are typically used in pastures. However, there are often not enough trees to provide adequate space for resting cows, especially on large dairies. Since these areas are overcrowded, deep manure packs can develop. Loafing in these overcrowded, manure-packed areas can cause udders to become soiled, which can contribute to increased rates of mastitis, high SCCs, and other health problems. Furthermore, allowing cows to have full access to trees usually exposes roots and leads to the death of trees. If trees are located near streams or sinkholes, the runoff from these denuded, compacted, and manure-covered areas can also contaminate water resources.

As an alternative, trees within pastures can be fenced off and a portable shade sled can be moved in and among pastures, saving forage area and preventing the creation of denuded, compacted, and manure-covered areas. Portable shade structures should be constructed according to the size of the herd and in such a way that they can be moved easily. When moved periodically, these structures provide fresh, clean grassy areas for cows to comfortably and safely rest. If shade structures cannot be moved, place the shade structure in a raised area to provide adequate drainage away from the resting area. For more information

about shade, refer to the University of Kentucky Cooperative Extension publication *Shade Options for Grazing Cattle* (AEN-99).

Another option for shade is to use trees outside the pasture along the southern fence line to provide maximum protection from the sun. Trees along the western edge of pastures can provide relief from solar radiation during the hottest time of the day. Carefully planning shade will allow cows to remain outdoors longer and help reduce the capital costs of housing. Providing shade can also help lure cows away from riparian areas.

Riparian Area Protection

On hot and humid days, cattle spend a lot of time loafing in natural surface water sources if they have access (Figure 1). Allowing cows to have full access to natural water bodies is a poor production practice from the standpoint of herd health and milk production, and Kentucky No Discharge Operational Permit holders are required to prevent direct contact of confined animals with waters of the Commonwealth. At least 11 different waterborne diseases, including Leptospirosis, coliform mastitis, Neosporosis, Johne's Disease, Salmonellosis, Anthrax, Clostridial diseases, and parasitism, can be contracted by cattle that have access to open water bodies.

Cows should be excluded from creeks, streams, and ponds using temporary or permanent fencing, and they should be offered alternative water sources. Cows will drink more if they have access to clean water, and they will consequently eat more and be able to produce more milk. From an environmental standpoint, cows can erode stream or pond banks and harm water quality in a short amount of time (Figure 1). The public can also be very critical of cows in natural waters,



Figure 1. This figure shows how dairy cows with full access to a stream can erode stream banks and pollute surface waters with sediment, manure, and bacteria. Photo by Amanda Gumbert.

which can lead to nuisance complaints. Cost-share programs are available to fence riparian areas, collect rental payments for lost crop production, and fund the installation of an alternative water source.

A gated stream crossing should be installed to provide access to pastures without allowing cattle to loaf in the stream. In some cases, the stream crossing could be used as a limited access point for drinking water; the water should be tested periodically for drinkability. For more information on cattle drinking water quality see the University of Kentucky Cooperative Extension publications *Drinking Water Quality Guidelines for Cattle* (ID-170), and for information of stream crossings see *Stream Crossings for Cattle* (AEN-101).

Manure Management Systems

Managing manure to control SCCs entails keeping alleyways free of standing manure, cleaning out stalls, and maintaining dry bedding. Manure management begins with free stall design, open housing systems, ventilation, and flooring type. Regardless of the manure handling system, the practices discussed in this publication can be implemented to improve cow performance while helping the environment. A 2010 survey of 48 dairy facilities in Kentucky found that producers use several manure management methods, the most common be-

ing lagoons (41%) and scraping (39%). Without adequate storage capacity, these systems present many challenges given today's environmental regulations. These challenges can be overcome with adaptive management and with future expansion and renovations, such as switching to a compost bedded pack barn. For more information on compost bedded pack barns, see the University of Kentucky Cooperative Extension publication *Compost Bedded Pack Barn Design: Features and Management Considerations* (ID-206).

Manure storage structures should be constructed to have at least 180 days of storage capacity, to allow application only when there is vegetative growth, and to avoid applications in the winter or within 24 hours of a rain event. Cost-share and technical assistance are available to construct manure holding structures through the NRCS. If the average weight of a dairy cow is 1,500 pounds and the calculations are based on 1,200 pounds, then the storage capacity will be inadequate. Adding wasted feed (silage or hay) and bedding to the structure takes up valuable storage capacity and must be accounted for during design. If the structure receives additional stormwater from defective gutters or drainages, this too will take up capacity and possibly lead to discharges.

Stormwater Diversion

Diverting clean stormwater from the production area can reduce the water volume that must be managed and can increase storage capacity of holding ponds and lagoons, which is a management philosophy called "keeping clean water clean." In many cases, diverting clean runoff not only reduces the amount of water that must be contained and managed, but it also creates a drier environment for the animals and reduces odors. Producers should divert as much stormwater as possible to keep clean water clean and conserve storage capacity. For more information about stormwater management, see the University of Kentucky Cooperative Extension publication *Stormwater BMPs for Confined Livestock Facilities* (AEN-103).

Nutrient Management Planning

Applying manure without first calculating an application rate based on soil test phosphorus (STP) and a realistic yield goal can result in an over-application of nutrients, especially phosphorus. Studies have shown that producers do not reap any economic benefit from applying manure when STP is more than 60 pounds per acre, and environmental impacts generally begin to occur around 400 pounds per acre. Also, applying manure when vegetation is not actively growing or to frozen soil contributes very little to crop yield potential but greatly increases the potential for excess nutrients to run off into surface waters. The best crops to apply manure on are row crops or high yielding forages such as alfalfa because they take up many nutrients, including phosphorus. Grass hayfields and pastures do not have the ability to remove the large amounts of nutrients generated by dairy operations. For more information about nutrient management, see the University of Kentucky Cooperative Extension publication *Nutrient Management Concepts for Livestock Producers* (AEN-113).

Failure to implement a nutrient management plan or over-applying nutrients to forages can potentially impact herd health and crops and may lead to regulatory action. Crops sometimes show luxury consumption of nutrients, which means they take up more nutrients than are required to sustain growth if a surplus of nutrients is present. Crops occasionally show luxury consumption of potassium (K), which increases the amount of potassium in the forage. For dry cows, the intake of excess potassium has been shown to increase the incidence of hypocalcemia (milk fever), retained placenta, metritis, displaced abomasum, and decreased dry matter intake.

Crops generally do not show the same luxury consumption of phosphorus (P) if more than 60 pounds to the acre is present, so phosphorus builds up in the soil, leading to a high STP. High STP can actually weaken soil, making it easier for mud and erosion to occur, which can hinder future productivity. High STP also causes the soil to produce more apatite (calcium phosphate) and magnesium phosphate, which ties up calcium (Ca)

and magnesium (Mg) in the soil, reducing the calcium and magnesium content in forages. If manure is over-applied, the forage may not provide enough calcium or magnesium for lactating cows. Because of the potential impacts of over-application on forage quality, forage should always be nutrient tested. However, if manure is applied properly, producers should be able to save money by decreasing the need for commercial fertilizer.

Nutrient management planning is required by operations that are ten acres or larger. Producers who use state or federal cost-share dollars to fund a manure storage structure will need to have a comprehensive nutrient management plan (CNMP) developed by a technical service provider. Cost-share dollars are available to offset the cost of producing a CNMP. Producers that are not participating in NRCS programs are required to develop a Kentucky nutrient management plan (KyNMP) themselves. A KyNMP is required to achieve compliance with the Kentucky Agriculture Water Quality Act and allows producers to be eligible for Farm Service Agency loans. For information on how to develop a KyNMP, see the University of Kentucky Cooperative Extension publication *Kentucky Nutrient Management Planning Guidelines* (ID-211).

Summary

Keeping cows clean by managing mud, manure, and runoff can increase production and profits while decreasing SCC and protecting the environment. Managing mud, manure, and runoff can help producers comply with health and food safety regulations and abide by environmental laws. Fortunately, state and federal cost-share funds are available for many of the BMPs used to keep cows clean. For more information about cost-share opportunities, contact the local NRCS and Conservation District office, and for technical assistance, contact the local Cooperative Extension office. Start using cost-share dollars today to implement BMPs that can improve your operation, preserve natural resources, and allow you to pass on a sustainable operation to the next generation.

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