

Guidelines for plant slowdowns, shutdowns & restarts

As part of our ongoing commitment to deliver innovation, expertise and support to our customers through our XCELIS® platform, DuPont developed the below guidelines for ethanol plants running at reduced rates or idling production. Drawing on their extensive experience working with plants across the country, our technical services team aligned on this set of best practices to ensure that when the time comes, your plant can return to normal operation as quickly as possible. Every plant will have a unique situation, so the guidelines should be used as a starting point and not a prescription for how each plant should handle slowing down or shutting down and restarting. Contact your DuPont representative for further information.

Slowdown

Enzyme dosing

- At slower rates: Check enzyme dosages and adjust according to new grind rates and extended fermentation times.
- At very low doses: Check pump capacities to avoid damaging pumps due to very slow flows.
- Reduce thermostable protease/defoamer dosing during slowdowns - this will help minimize FFA accumulation and syrup darkening that can result from increased retention time.

Infection control

- Because slower fermentations are more susceptible to infection, consider increasing antibiotic dose to reduce chance of potential infections from extended fermentation times or call your DuPont representative to discuss FermaSure® XL.

CIP

- At slower flow rates: Review CIP practices for mash trains, ferm fill header, etc with the extended time since most procedures are designed for full run rates.
- Extend CIP time during slowdowns to prevent build-up in mash trains caused by lower mash velocities and mash settling in the trains.

Water balance

- Plants may choose to either thin out or keep solids but at lower flow rates, or a combination of both. Please call your DuPont representative if you would like to discuss trade-offs of different rate reduction strategies. Each option will impact water balance and energy considerations in the plant differently.
- Scrubber water: Water may accumulate if plants haven't run tests on scrubber water requirements at slower rates and therefore can't reduce scrubber water addition.

Dryers

- For some smaller plants, dryer efficiency may be impacted if the rate slows down (DDG overdrying because of slower flow). Adjust whole stillage tank levels so the back end is not as slow as the front end, for example.

Shutdown and restart

Shutdown preparation

- Check routine order status and update to minimize enzyme inventory where possible.
- Lower solids to clean out ferms – if ferms/vessels not emptied, dose extra antibiotics to prevent organic acid build-up.
- Reduce tank levels across the process, but leave a ferm or two full for restart so there will be some beer feed flow at startup. If time allows, plants may gradually reduce tank levels prior to shutting down.

Enzyme storage

- Recirculate enzyme tanks periodically (if not empty) or transfer product into clean totes and clean enzyme tanks after emptying. Totes on hand should be thoroughly washed with hot water prior to use.
- Inspect tanks periodically - condensation may occur in tanks due to ambient temperatures changes. This may cause growth in the tanks (mold, bacteria etc).
- For products in totes, drums, pails, or boxes, ensure materials are not stored in direct sunlight or any adverse conditions. Also ensure practices are in place to protect the integrity of the packaging (e.g. water damage, bird droppings, etc).
- If shutdown is longer than 2 months contact your DuPont representative to verify enzyme activity prior to restarting.

Process water

- Periodically run HPLC samples of thin stillage, cook water, backset, scrubber water and other process streams stored for shutdown; dose antibiotics as a precaution, or call your DuPont representative to discuss FermaSure® XL.
- Run all water streams through the methanator (if in use) and cook before using for startup.
- Check pH prior to use, as most alpha-amylases require pH above 4.8 to be effective.
- If stored in vessels for extended time, check water for sulfite, sodium, propionic acid, butyric acid and other potential yeast inhibitors.

Other process considerations

- Cooling towers: Use the recirculation loops to keep the water from becoming stagnant.
- Maintenance opportunities: Hammer Mills, Centrifuges, Mash headers, Evaps, Exchangers, CIP the Beerwell.



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