

Agricultural Industry Solutions

Esmil and our Partners have conducted much research and gained vast experience in the field of effluent treatment within the agricultural sector. From bench scale studies right the way through to full scale plant operations we strive to offer BAT (Best Available Technology) using state of the art membrane separation and dewatering processes.

Esmil has a long and strong history of taking a challenging effluent and turning it into a valuable clean water stream. The side products of our treatment solutions can often be utilized to add value such as product concentration and energy recovery.

Tackled Effluents

- Biogas Plant Digestate
- Dairy Effluents
- Manure/Animal Waste Dewatering and Treatment
- Other alternatives to lagoon and evaporative storage ponds

No two effluents are the same and neither is Esmil's approach at how to treat them to the required standard in the most effective and economical manner.

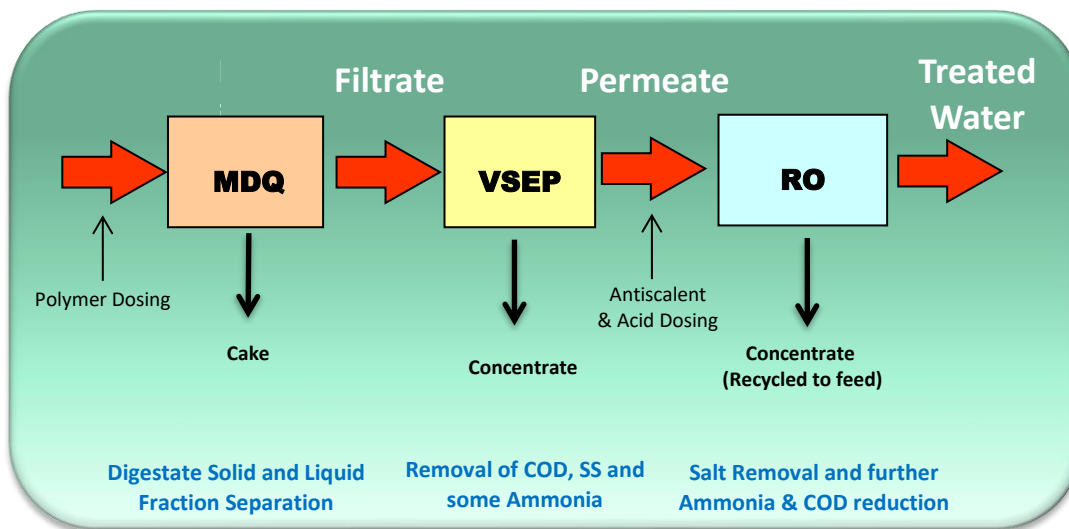
Effluents including animal waste, manure and digestate have a high water content requiring large storage and transportation volumes essentially adding very little to the operations bottom line even when sold as fertilizer, landfill covers or other product. Our solution is to concentrate this valuable product into a solid fraction and concentrated liquid fraction reducing the overall storage and transportation costs whilst retaining product value. Using our wealth of experience in membrane technology the water fraction may be treated to a very high standard depending on the needs of the client, for instance:

- Reuse within the process
- Irrigation
- Discharge to the environment
- Discharge to foul sewer

Our typical approaches to handling agricultural effluents include selecting suitable primary treatment like that of our partners highly effective equipment including dewatering multidisc screw dehydrators and dissolved air flotation (DAF) units. Downstream a range of membrane and other technologies can be employed for removing the contaminants from the aqueous effluent:

- Membrane grades ranging from Micron filtration all the way up to Ultra High Pressure Reverse Osmosis
- Variety of membrane configurations; spiral wound, vibrating (VSEP), tubular, submerged among others
- Further pre and post treatment such as media filtration (MMF), activated carbon (GAC) and ion exchange (IEX)

Digestate Treatment Process Description



The flow chart above illustrates a tried and tested Esmil process in the treatment and resource recovery of digestate. The first stage is the separation of the solid and liquid fraction or digestate dewatering. For this we employ our Partners highly effective Multidisc Screw Dehydrator which with the assistance of a small dose of polymer is able to remove the majority of solids from the liquor and produce a dry cake.

The second stage makes use of another of our Partners proprietary technology. VSEP vibrating membrane technology causes high shear forces at the membrane surface, greatly reducing the risk of fouling. The high shear processing exposes the membrane pores allowing for maximum permeation of treated water. Therefore, VSEP is able to remove any remaining solids which would cause major issues for standard membrane systems along with other soluble contaminants allowing clean water to permeate through and nutrients and solids to be retained within the concentrate.

Our final stage of digestate treatment is a spiral-wound reverse osmosis membrane technology. This acts as a polishing stage further treating the permeate (treated water) from the VSEP units.

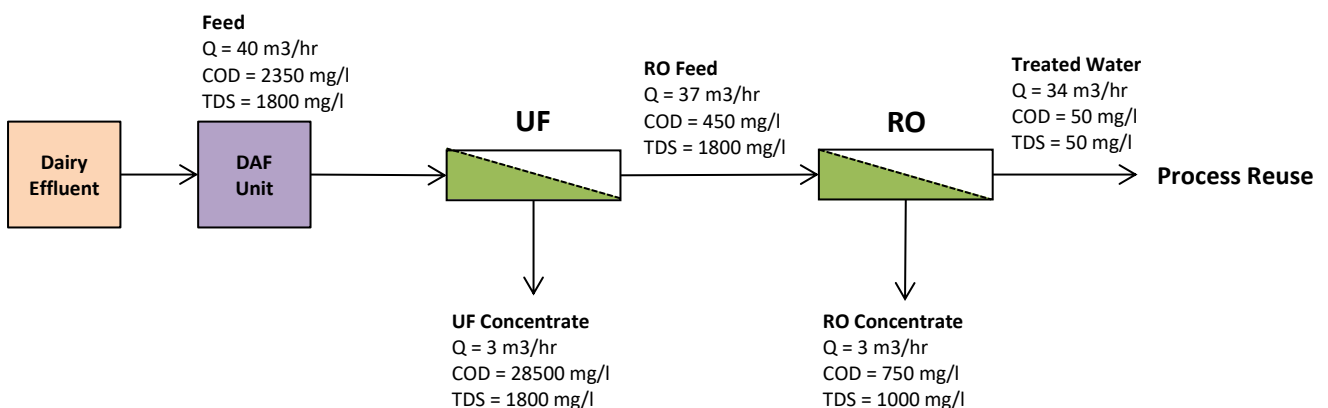
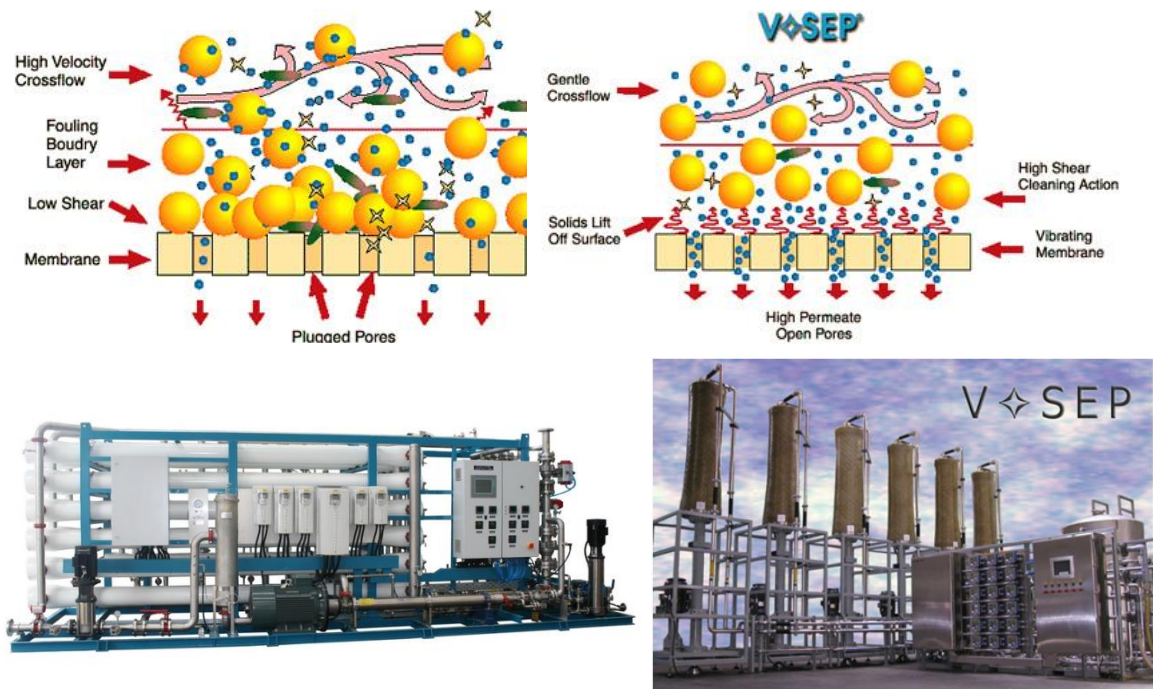


Figure 2 demonstrates a characteristic dairy effluent with low solids content but high FOG and COD arising from storage tank and process equipment cleans. The high COD attracts financial penalties if directly discharged to sewer. Esmil's approach is to obtain a very concentrated waste stream with high calorific value; suitable for anaerobic digestion plant feed or other disposal/destruction route. By application of reverse osmosis technology, high quality treated water is also produced suitable for reuse within the process; helping to reduce the dairies water consumption whilst improving plant economics and environmental impact.



Agricultural Industry Design Philosophy

We strive to use the most appropriate solution to suit your agricultural treatment requirements. Although we have detailed one specific proven digestate treatment process, we are not limited to these technologies as we have a vast range of experience in other technologies. This includes membrane bio reactors, aerobic treatment, media filtration, ion exchange and other membrane technologies across a range of effluents and industries.

It is essential to follow a number of steps to ensure that your tailored agricultural wastewater treatment process performs as well and economically as possible to achieve your treatment goals.

- Chemical testing to achieve high flocculation efficiency for high solid effluents at the lowest dose rate.
- Lab scale dewatering and membrane trial and selection to ensure process feasibility
- Long term site pilot trial to allow for feed variation and data gathering
- Extensive plant design incorporating capital and operating expense calculations
- Build, Installation and Commissioning
- Comprehensive service support including maintenance and system upgrades.

References:

- 2013 – Kurana UAB, Grain Bioethanol, Lithuania (VSEP, RO)
- 2017 – Wipptal Cow Manure, Italy (VSEP, RO)
- 2018 – Quasar Energy Group LLC, Municipal Sludge, USA (MDQ)
- 2018 – Renergy Inc., Wastewater Treatment Plant, USA (MDQ)
- 2018 – KB BioEnergy Inc., Wastewater Treatment Plant, USA (MDQ)
- 2019 – PowerCrop – Russi, Ravenna, Italy (VSEP, RO)

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