Raslysation Technology and its effect on unwanted microorganisms.

Thank you for attending our webinar.
We have received several great questions
that we have answered below.

Why is the UV filter necessary? Is there any negative effects when it is not used?

By using the UV filter a number of potential issues are prevented, such as oxidation and the risk of UV flavor.

What is the optimal operating temperature for cheese milk?

We don´t have an optimal temperature, we can treat the cheese milk cold as hot.

Is it possible to add the CPS to a current setup of pasteurization, only to eventually achieve ESL? How does the milk respond to a CPS treatment and a pasteurization?

Yes – it is fast and efficient to install a CPS system into a current setup due to the plug and play nature of the system. A combined solution increases the shelf life of the product and the specific performance depends on the initial microbial load of the product. The ideal way to achieve this is by using cold pasteurization first, then followed by the thermal pasteurization step. This can be achieved without any negative organoleptic impacts. We have a customer case where this exact solution provided ESL of 32 days for skimmed milk when stored at 6°C.

Milk separates better at 140F (60 C°). Do you have information about how well it separates at 37F (2,7 C°)?

Yes, a milk separator has a higher capacity at higher temperatures, but it also makes it necessary to CIP longer and more frequent. For many of our customers and to my knowledge ~95% of Australian dairies use cold separation at approximately 15°C. I do not know the exact efficiency our customers achieve, but I am told that the capacity is reduced down to approximately 50%, but at the same skimming efficiency. This makes it easier to control micro levels and increases up time while reducing CIP requirements. Cold separation is especially well suited to be used in extension of our technology, however we typically recommend using our CPS system on the raw milk before it is separated.

What Reynold's number do you need for turbulent flow ?

When Reynold number is higher than 3500-4000 the flow is turbulent

Do you have an overview of the family's of bacteria neg or pos for example Staph areues?

The following paper contains a list of that can give you greater insights: *Novel Conopeptides of Largely Unexplored Indo Pacific Conus sp., Eline K. M. Lebbe et al., 2016*

Does the UV treatment inactivate the rennet in the whey?

We have not investigated the inactivation of rennet, but other studies show that enzymes are not affected by UV treatment.

What Capasity is the CPS system?

The CPS is rated at 7000 L/H. However, the modul based design ensures that if you have a higher flow more units can be attached

Do you have experience in handling the HACCP concept? With standard pasteurization the temperature is the controlled parameter. What is assumed here?

Yes. We use a measurement of the UV dose over time just like you would measure temperature over time. Depending on the application we know what is required and we measure and log this to live up to the requirements.

What is the minimum flow rate the unit (CPS) can operate at?

The minimum capacity for a standard unit depends on the product. Standard for milk is 7 m3/h, in special configuration the capacity can be down to 1.8 m3/h. The module-based design does however ensure that if you have a higher flow more units can be installed inline to fulfill your needs.

An example is that if you have a line running 25m3/h, you can install 4 CPS units in unison and they will be able to handle your full flow.

What capacity is the test plant?

The test unit can run 400 L/H when testing on raw milk. If the test is performed on a more transparent product as eg. whey it may be able to treat up to 1000 L/H. It is thereby very dependent on which product you are interested in testing on but reach out to us and we can help you set up tests for your specific products.

It is also important to note that the test unit can be used for either batch productions or continuous flow production depending on the needs of the customer.

How high can the fat content in the milk be?

Our Recommendation is to treat your product before separation as Raw milk is optimal for Raslysation, Whole milk is also no problem to treat. When the product has a fat content as high as eg. cream with 38% fat then the process becomes more difficult to use.

Is there a risk of mutations in bacteria that have not been destroyed?

The UV-light breaks the amino acid connections in the DNA/RNA and make a crosslink in the DNA, so the replication ability of the microorganisms is broken. So, the germ will thereafter start its own autolyze.

You say that even spores are inactivated. Guess that we are not talking about any kind of spores?

The dose needed to inactivate spores are dependent on the exact kind of spore and can be looked up in a UV dose chart. For example, Aspergillus Niger spore (ATCC 32625) requires a dose of 245 mJ/cm2 to achieve a log 2 reduction, while a bacillus cereus spore (T) only requires 30 mJ/cm2.
See below

Fluence (UV Dose) Required to Achieve Incremental Log Inactivation of Bacteria, Protozoa, Viruses and Algae, Adel Haji Malayeri et al. 2006 *Link*

If I have a filling machine that stops downstream, how long time can the product stay inside the unit, or shall it go to the drain?

Since the machine is air-cooled, the system will not overheat if there is a stop in product flow. Depending on the product and the duration of the production stop it may or may not require, the product to be sent to the drain. The holding volume of our systems is low, so if you get overexposed product, then it will only be the small amount of waste. If the system is installed for product recirculation, then this option can also be used for some products.

What are the benefits of this technology?

The benefits are many but some of the largest benefits are: High energy savings during production, high water savings during production and High product quality since there is little harm done to the product. There are many more so if you are interested in hearing them all the reach out to our friendly sales team.

You said that gram negative bacteria are more vulnerable. You mean to the UVC process?

Yes, gram negative bacteria are more vulnerable to UV light. If you would like to investigate further it is shown in this paper: *UV Light Application as a Mean for Disinfection Applied in the Dairy Industry. A. Chawla et al. 2021*

How much product is in the CPS at any moment in time?

Between 7-10 liters, depending on the capacity [m3/h] of the CPS.

Do you have some results with the acidophilic bacteria?

In a low pH product like orange juice, we have seen a 4 log reduction for aerobic bacterial counts.

You mentioned a maximum temperature of 85 °C, but what is the average temperature increase during production?

Our Teflon coils have a limit of 85°C if temperatures exceed this deformation may occur. This deformation may impact system performance, therefore temperatures during production or CIP should never exceed this 85C° threshold.

During production using Raslysation the average product temperature increase from inlet to outlet, is between 2-4 °C.

Is the technology based on UV C-light, UV B-light or both?

Our flagship system, the CPS, is based on UV-C light. We always strive to ensure that no harm is done to the liquid product and that our equipment is as efficient and gentle as possible. The light filters are implemented to ensure that only the useful wavelength of 254 nm will come into contact with the liquids.

You mentioned steam use, but where do you use steam in this system?

We don´t use any steam to treat the product, but when running CIP it is used since the system, utilizes a standard CIP procedure.