The Ventafresh System

How to increase the shelf life of a Fresh Food Product?

The main objectives to increase the shelf life of a Food Product is reducing the microbiological load of a product and to create ambient conditions in the packing in such a way that remaining strains of microbes can not multiply and all this without altering the product in its freshness, morphology and sensory aspects and without the remains of residues or without having to declare on labels a lot of E-Numbers or special treatments like radiation or genetic manipulation.

There are several options and known technologies to increase shelf life of Fresh Products which are all in a way effective but are not sufficient enough or are altering in one way or the other the morphology or the taste of a Fresh Product or are subject of special permission or label declarations. To mention only a few: pasteurization, sterilization, impulse steam heat treatment, oscillating magnetic fields, gamma radiation, genetic alteration, vacuum packing, active and passive modified atmospheres with advanced film technology, high pressure treatment, preservatives and acid additives, bacteria, fumigants, scavengers of different gases, UV-C light, ultra sound, ozone and other oxidants.

In research work of the last 10 years scientists of SWISSFOOD TECH have tested all and were able to gradually lead to perfection a process called VENTAFRESH which we also like to call the process of “cold sterilization”.

The VENTAFRESH Technology is a combination of several sterilization methods combined with new packaging applications of an advanced active modified atmosphere and a new film technology.

The VENTPACK and VENTAFRESH PROCESSES are patented and at present in the international application phase of the PTO in Geneva and protected in 54 countries worldwide.

The VENTAFRESH process uses advanced oxidation hurdle technology using ozone, UV-C light with wave length of 185 and 254, oxygen (O_2), carbon dioxide (CO_2), argon and ultrasound.

The first commercial prototype application unit, under a VENTPACK process license, was built in 2002 for BERGAS GOURMET in Spain. The process was first used for fresh cut produce like fruits and vegetables and was so successful that other food items like meat, pasta, rice and potatoes are today also included in the process.

Here we explain the process for fruits and vegetables with several pictures:

The raw materials are arriving in the plant directly from the fields mostly in un-cooled conditions and are immediately passing the hydro cooler where ozonated water with a concentration of minimum 8 mg/Liter and with a temperature of 2 Cº is applied during approximately 10 minutes or up to the point the temperature of the product has reached 4 Cº. The off-flow of residual water has to have a remaining concentration of 2mg/Liter. Therefore concentration is measured only in the off-flow water to guarantee concentrations higher than 2 mg/Liter

This cold treatment is a pre-wash application before cutting.

This treatment with ozonated water is microbiological not so efficient since the produce is not submersed totally and therefore only partly in contact with ozone.

The microbial load in this stage before washing is, depending on products, in the range of approx. 1.5 Mio TMC (total microbial count).

After the produce is trimmed and cut in the desired sizes and put in mesh crates the produce is submersed in a belt driven water stream bath containing ultrasonic transducers and UV-C Lamps of 254 nm wave length in tube formation. This equipment

has a length of 10 meters and the transit time of the produce depending on variety is approx. 5-10 minutes.

With the ultrasound transducers cell membranes of microbes are ruptured through occurring cavitations of small collapsing water bulbs produced by the Ultrasound waves whereby molecular speeds of 1000 times the speed of sound are occurring against which cell or nucleus membranes can not resist and are bursting. With the help of UV-C radiation which dissolves as well membranes and is destructive to DNA structures the combined treatment is deadly to microbes since natural available defense and repair systems of microbes are collapsing mostly because of exhaustion of available energy in the cell metabolism.

The ultra sound treatment is not only deadly to microbes but has also excellent cleaning properties to the surface of produce. This way it is possible to clean fresh cut delicate lettuce or baby leaves or bloody chickens without exposing them to abusing water agitation treatments and broccoli or cauliflowers and chickens are as well cleaned from inside. The produce is staying fresh crispy clean and without damages.

After the produce is leaving the belt of the ultrasound and UV-C tunnel the last effective kill is made in the belt driven ozone bath with a minimum concentration of 8mg dissolved ozone in the water with a PH of between 5.5 and 6 and a water temperature of approx. 4 Cº. As a catalyst, small amounts of CO_2 are injected together with the ozone in the water improving the microbial kill. The CT value of most fruits and vegetables is around 40 (5 minutes with a concentration of 8mg/liter).

After leaving the ozone washing tunnel the produce is dried with an air jet drier or a centrifugal drier.

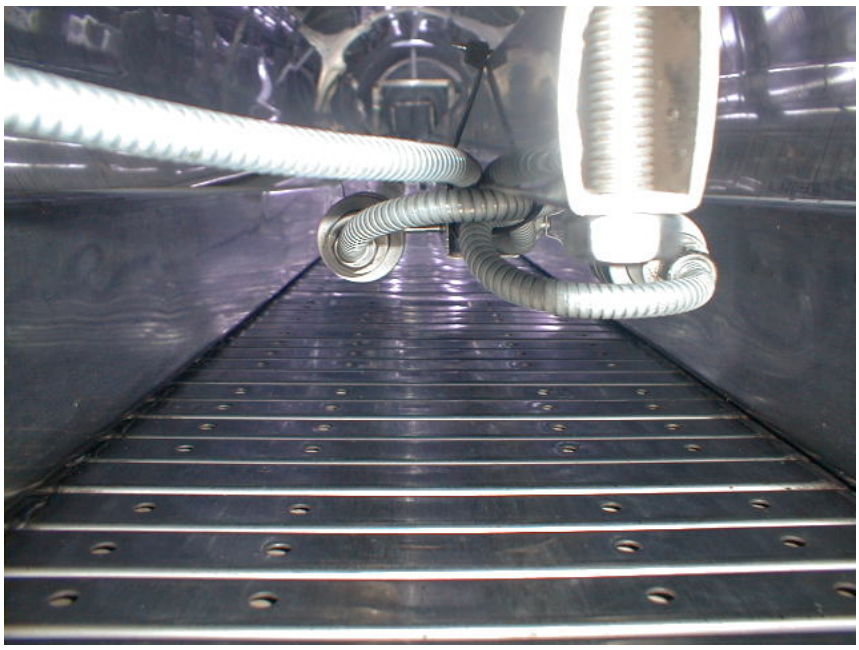
The product is then transferred immediately in a hermetic container which can be put under modified atmosphere or is directly packed under aseptic sterile conditions with a Modified Atmosphere on a vertical bag-filling machine.

The product is reaching the transit cold rooms put at 2 Cº and the packing room at 8 Cº. These rooms are UV-C treated air pressurized sterile zones.

The produce packed in trays is also packed under highest sterile conditions. The trays are sealed with a changed modified atmosphere containing ozone which works as a final disinfecting fumigant. After the trays are passing an UV-C tunnel where the ozone is again destroyed and transformed to oxygen by UV-C Light of 254 nm to prevent that ozone is affecting the produce through excessive exposure.

The also patented new sealing films are special laminates either for respiring products or precooked products and contain a special vapor pressure releasing valve which allows cooking food directly in the tray either in the microwave or convection oven without further manipulation in only 3 to 6 minutes depending the product with only half the cooking time of conventional methods.

The film has a super anti fog coating and bactericide and ethylene scavenging properties.



With such technologies a product shelf live of 14 to 21 days or more can be achieved. A shelf life of 14 days is fully adequate for a fresh product and fits the requirements of logistics of producers, retailers and restaurants and consumer preferences.

The Products of BERGAS GOURMET who is the first license taker in Europe for the VENTPACK system are since one year very successfully sold in Europe in supermarket chains like Corte del Ingles, Carrefour, Au Champ, Monoprix, System U in Spain, France and Belgium.

To demonstrate the efficiency of the VENTAFRESH System we will show some petri dishes of the worst results since normally the petri dishes are clean after 24 hours in 37 Cº.

After the ozone washing in the hydro cooler a product has normally below 1.5 Millions TMC.

After the ultrasound and UV-C treatment the TMC is 6000 and after the ozone treatment we have reduced the TMC to 200- 600 which is in the range of permitted values of baby food. The VENTPACK PROCESS is able to perform 3-5 log reduction in the washing process and a total sterilization with the use of ozone fumigation in the tray pack.

The VENTAFRESH SYSTEMS ® present the 10 following advantages:

1. For the first time it is possible to harvest the fruits and vegetables in their stage of maturity and to keep them for a longer time by keeping their quality without risk of any damage. The consumer has so the pleasure to consume a product having reached its full gustative maturity.
2. The logistic relative to the distribution of fruits and of vegetables is simplified in all commercial stages. The VENTAFRESH SYSTEMS® gets a greater flexibility and every guarantee in term of the preservation of the freshness of the packed product.
3. The transport expenses are lowered, as the very expensive airfreight can be replaced by a transport by boat or by lorry.
4. The losses and changes are very reduced and justify completely the small supplementary costs of the packaging.
5. The peaks of harvests can be smoothed and the drainage of the products regulated. The seasonal offer can be prolonged without the risk of losses.
6. The durability of the fresh products is guaranteed during all commercial stages until the sale to final consumers. No risk of complains due to loss of quality during the times of transit. The invoicing is facilitated to all commercial stages due to the fact of no alteration or decrease of quantity.
7. The VENTAFRESH SYSTEMS® packaging is well adapted, beside the long possible conservation of the products, to a perfect use of microwaves, allowing a faster and less expensive cooking of food.
8. Thanks the air valve on the packaging, the produced vapour lours of the cooking can escape in the case of high pressure without risks of packaging explosion. By the combination of the microwaves, of the heat and of the pressure of produced vapour the time for cooking fresh products can be reduced to a half compare to a normal cooking time in a microwaves oven. The flavourings and vitamins are protected in an optimal way by this cooking method.
9. This cooking system, for which the application or the imitations are protected universally by the patents deposited by VENTAFRESH SYSTEMS is very well applicable to all kind of products defined under the concept of Convenience - Food. The readymade delicate dishes can be prepared with fresh products and be ready to be consumed in 4 minutes cooking in a microwaves oven of 1000 watts.
10. The protection valve-film can be removed very easily. Finally the trays containing the food can perfectly be used as the eating-plate.