University of Foggia

Department of Food Science

Food processing in the Space. What improvement for the Earth?

Antonio Derossi

AGROSPAZIO. RICERCA E TERRITORIO.
Sperlonga 25-26 maggio 2006

During the last congress

Food for astronauts must have the following characteristics:

- Safety
- Ready to eat or easy to prepare
- small volume and low weight

In case of long space mission such as mission to mars a lot of questions that food science research must given answers:

✓ how is possible to bring food necessary for long time missions on mars planet ?

✓ how is possible to have a correct and equilibrated diet for human consuption for long time ?

✓ Are we sure about the safety of our food products for long time kept in particular environmental conditions like Mars conditions for long time ?

Our idea

To trasform *in situ* vegetables growth in greenhouse systems into several food, ingredients and recipes.

by inflatable plants

Don’t need to bring food from heart to mars planet

Don’t need to use strong stabilization treatments (like sterilization dehydration or freeze drying processes)

We will be able to keep organoleptic and nutritional characteristics close to raw material

First step

to project systems based on inflatable technology to carried out every single step of traditional food processes

Low weight

Easy to transport

Easy to clean

Particular thermal capacity and conductivity

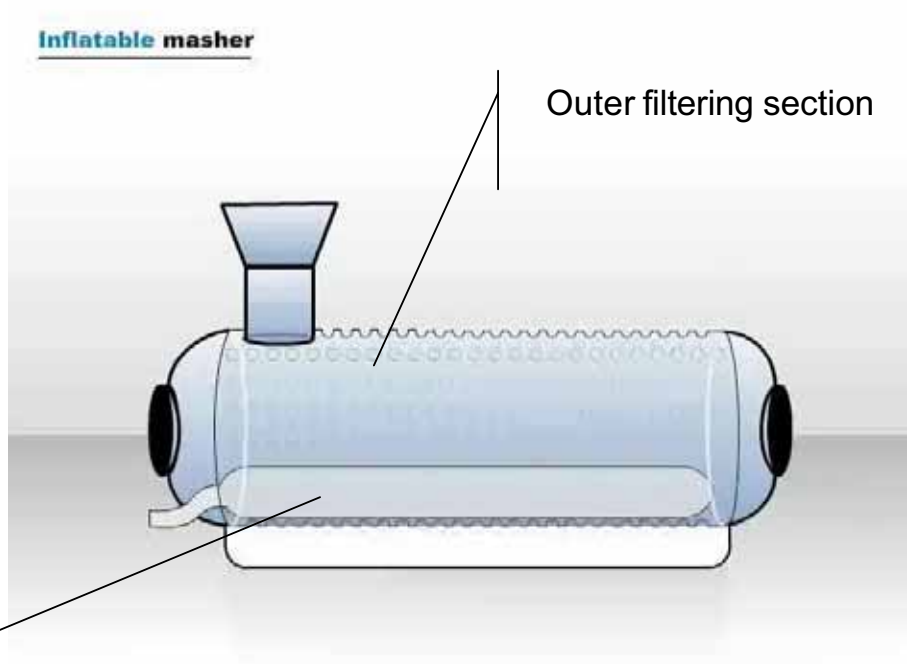
Particular mechanic characteristics (resistant at cuts and bumbs)

Modular flow chart

Use of air as driving force

Inflatable systems for food production

Usually used to obtain tomato sauces



Inflatable masher may be used on mars planet

Inflatable blancher

blancher is a system used to inactivate enzymes or to reduce pH values of fruit and vegetables till 4.5

Heat systems

Inflatable blancher may be used on mars planet

Inflatable section

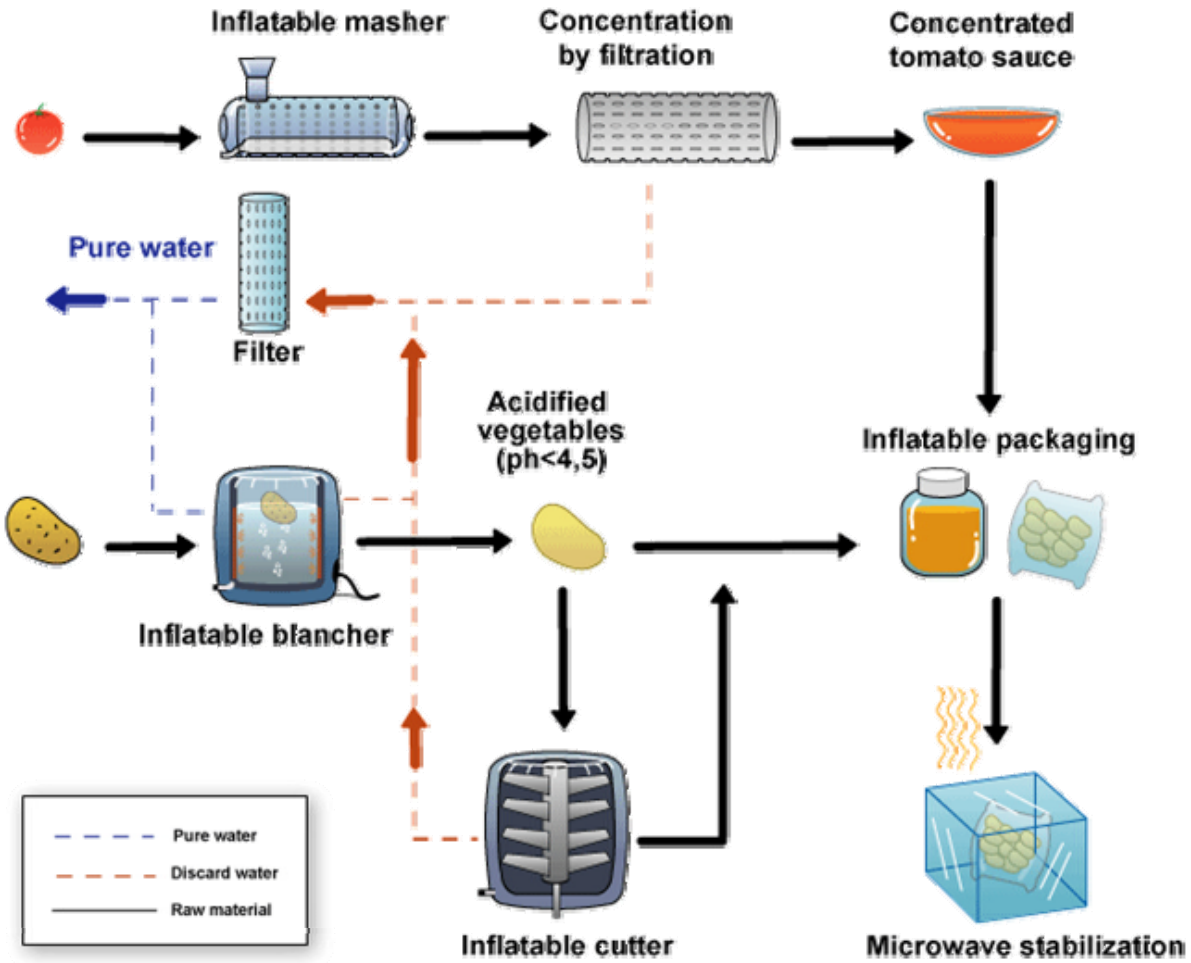
Inflatable cutter

Traditional cutter used to obtain sticks, dies, slices

Inflatable cutter may be used on mars planet

Flow chart for vegetables food

Second step



Università degli studi di Foggia

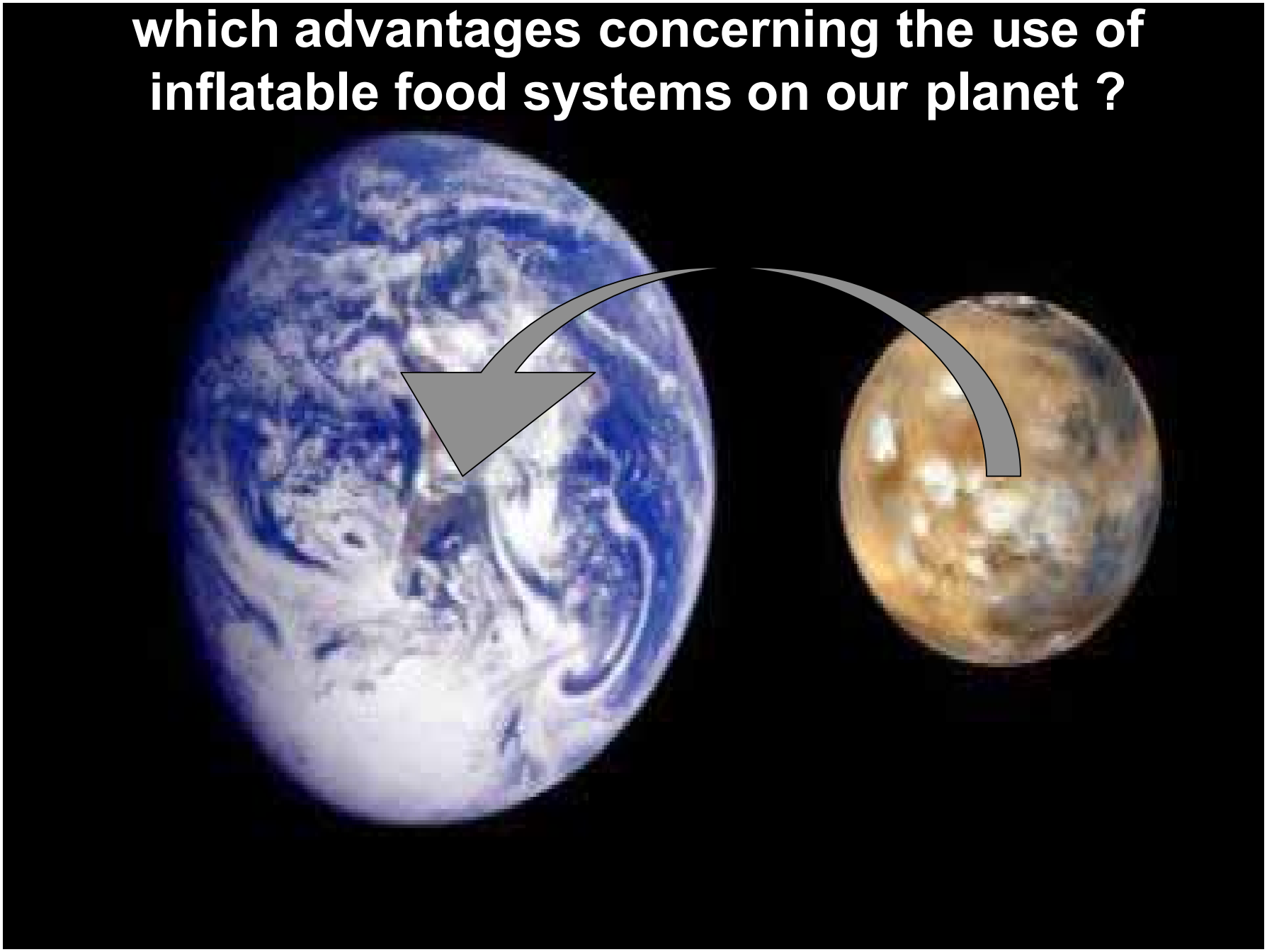
Adding ingredients such as olive oil or species

- Tomato juice
- Diced tomato
- Tomato creams
- Tomato sauce with basil
- Tomato sauce with asparagus
- Tomato sauce with artichokes
- Tomato and asparagus soup
- Tomato and artichokes soup

- Asparagus creams
- Whole asparagus in water
- Asparagus and artichokes soup

- Artichokes cream
- Artichokes pieces in water

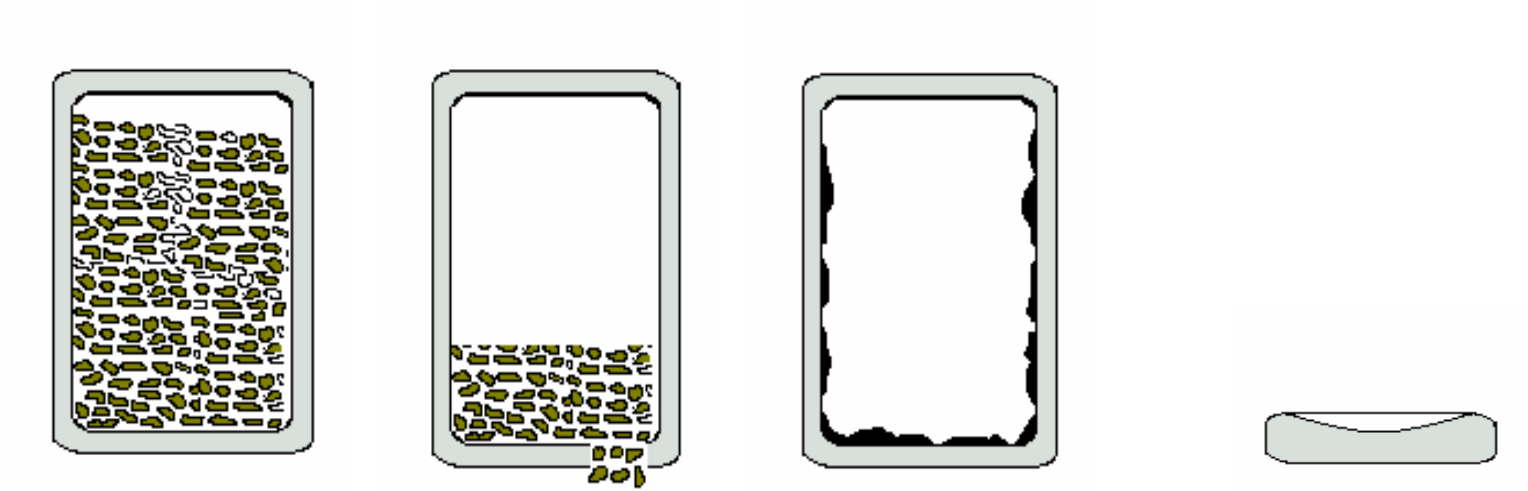
which advantages concerning the use of inflatable food systems on our planet ?



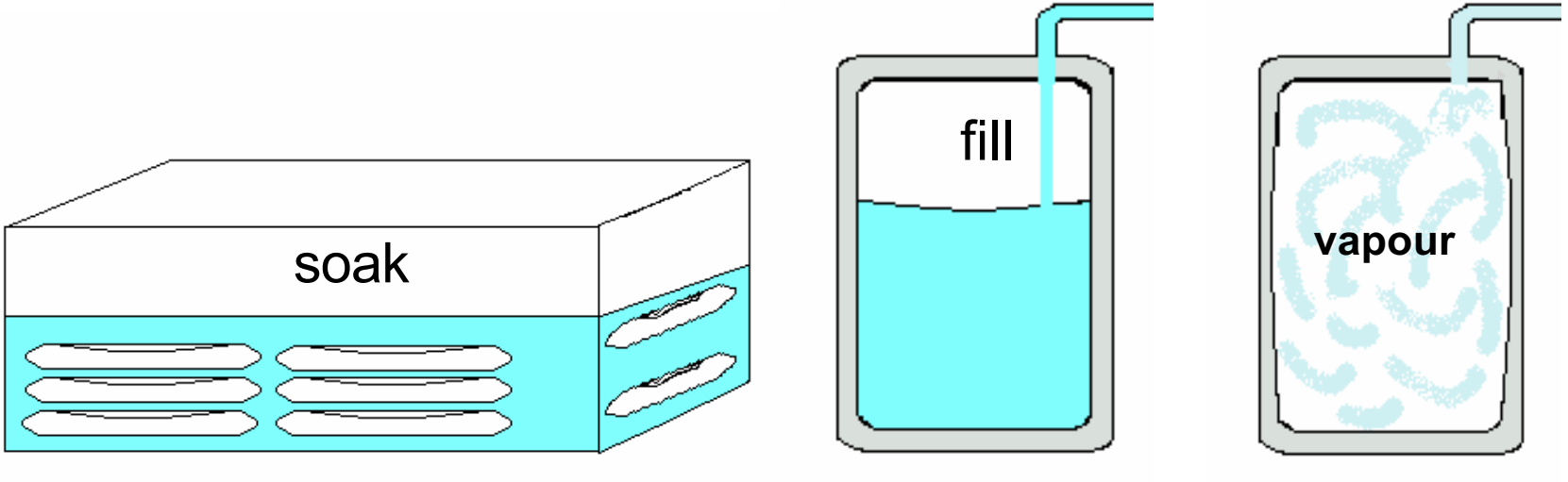
Traditional tanks takes up to much space in train station or port of loading area

Inflatable systems may be more easy to clean

Inflatable systems may be more easy to clean



Chlorine solutions



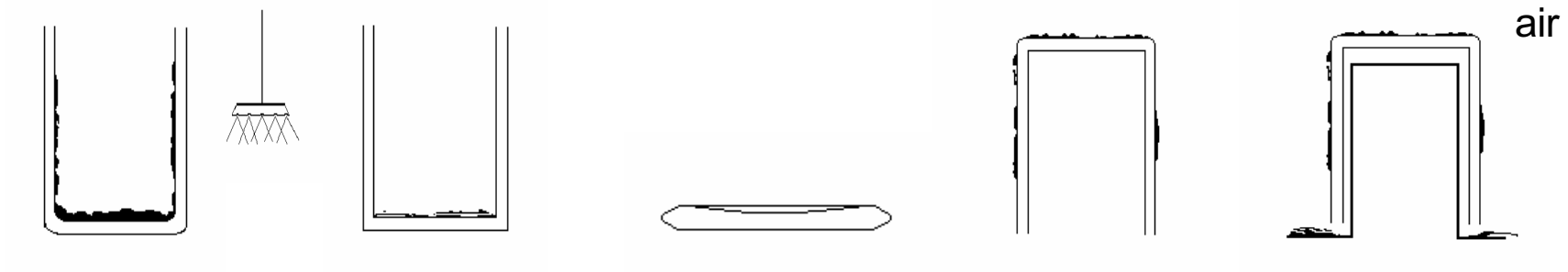
Università degli studi di Foggia

Reduction of problems concerning water residues and microorganisms growth inside traditional tanks

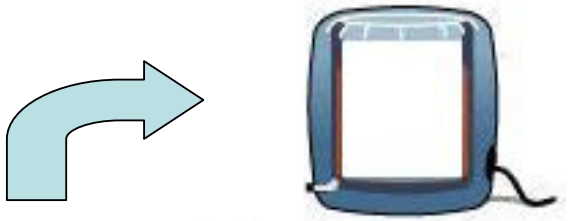
Usually it is hard to remove the residues of water into a metal tanks after their cleaning and washing

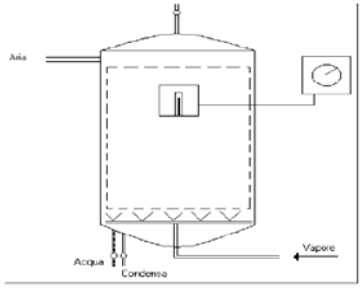
this is an important problem because the water can allow microorganism growth

Inflatable tanks could be cleaned more easily without residues of water



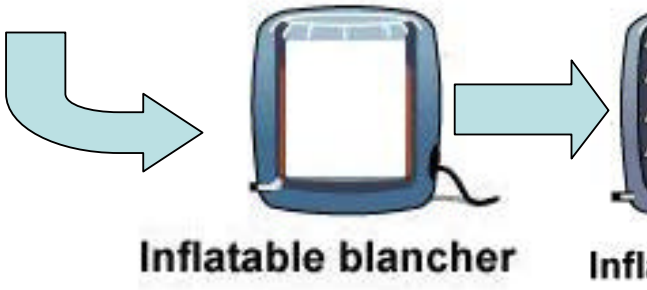
Modular flow chart

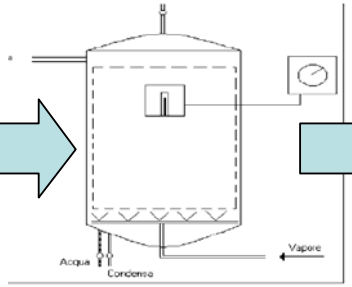




Whole asparagus in water

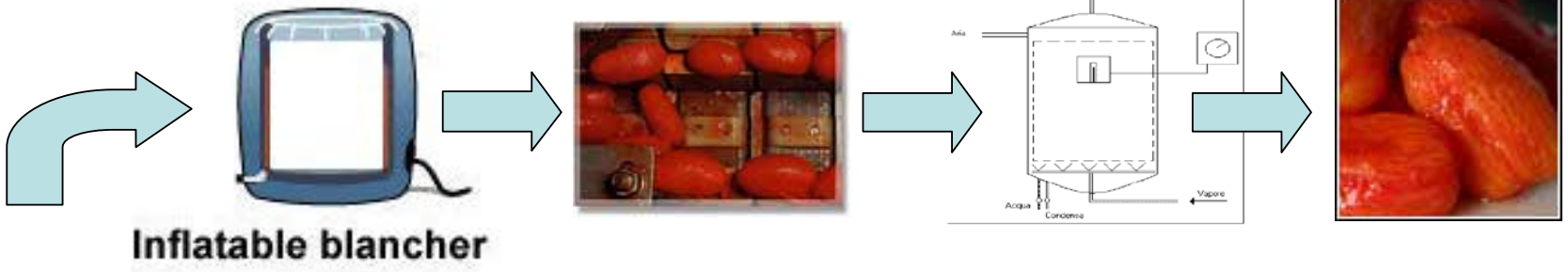
Frozen asparagus



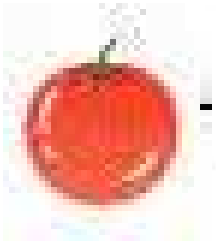


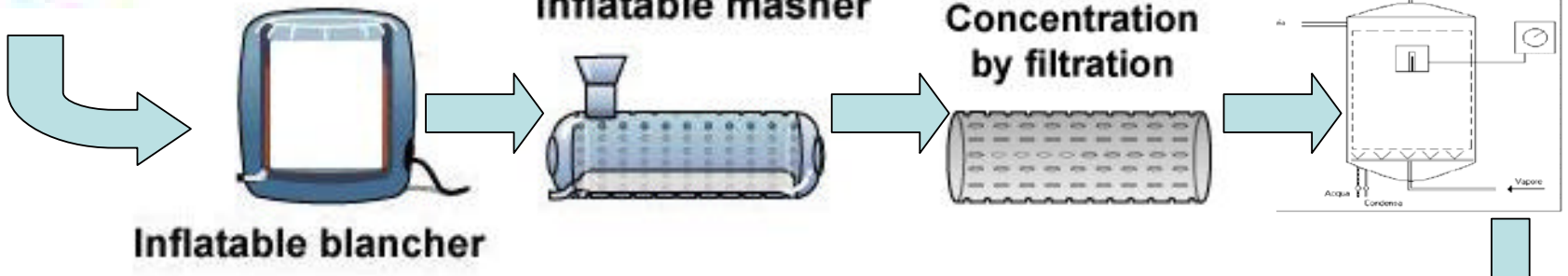
ASPARAGUS CREAM

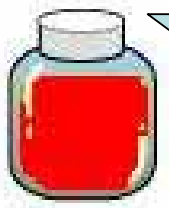
Modular flow chart



TINNED PELED TOMATO







TOMATO SAUCE
Tomato juice

It Will be necessary pay attention about…..

Loss of chemical compounds from polymeric materials

Thermal characteristic (conductivity and heat capacity)

Acid resistance

Chlorine resistance

Solvent resistance

High temperature resistance

Process variables (pressure, air flow, temperature)

Time contact with chemical compounds to sanitize inflatable plants

30 years ago the development in terms of process innovation in food industry stopped

The inflatable techology studied for missions on the Space could be the future for food industry on the Earth.