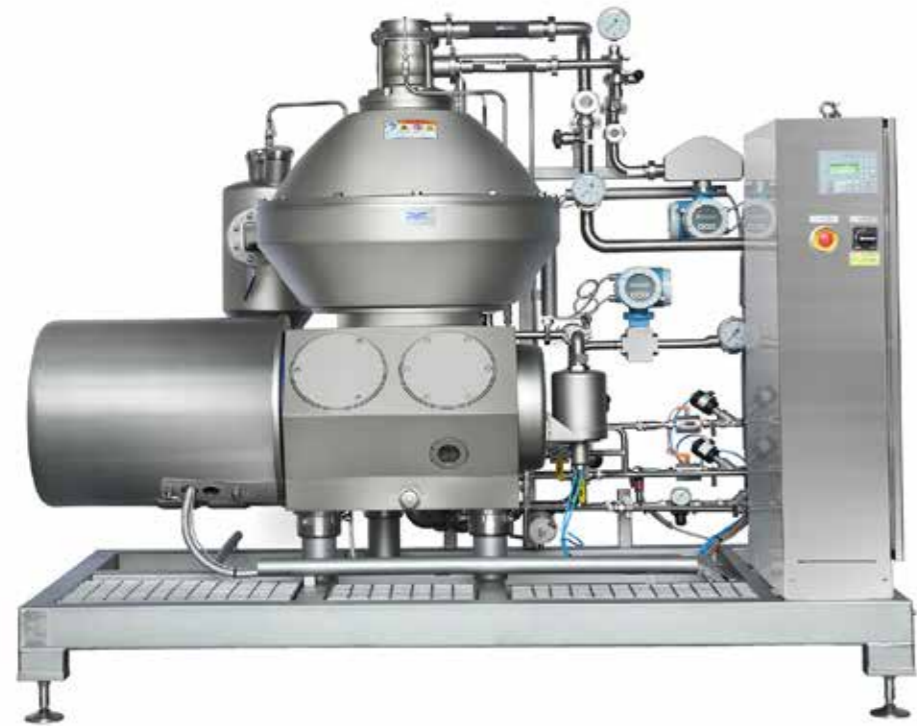




If you have a reliable supply of the necessary fresh animal blood, Alfa Laval can help you turn this source material into a high-value edible protein product.

Using animal blood as the source of such edible proteins requires specialist equipment as well as detailed know-how about both products and processes.



Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineered solutions. Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com

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Premium blood proteins

Functional, edible proteins from animal blood



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Prime protein



Raw blood into high-value products

It has long been standard practice for much of the blood from animal slaughterhouses to be coagulated, dewatered and dried into blood meal, which is then sold as animal feed.

However, blood that has been collected in a suitably hygienic manner can be processed to make it suitable for human consumption as a food ingredient. This represents considerably greater commercial value.

Animal blood consists of plasma and red cells (also called haemoglobin). The plasma constitutes up to 60% of the raw blood – and is a functional protein with commercial potential. The red blood cells are usually put to non-edible use, but can also be dried into functional and flavour edible protein in powder form.

Gently does it

To be sold as high-value products, edible proteins in the form of plasma powder or concentrated plasma must be processed with the utmost care. This means minimizing any air and water present, as well as avoiding

any shear effect that might rupture red blood cells and turn plasma red.

Controlled temperature

Because of its high nutritional value, blood is particularly susceptible to bacterial growth.

Rigorous control of the temperature of the raw blood and plasma is therefore necessary in order to ensure an end-product that meets the exceptionally stringent requirements associated with food-quality ingredients.

Know-how makes the difference

With years of experience in supplying processing systems for a vast range of different edible products, Alfa Laval has built up unparalleled know-how and experience in the use of proteins as added-value ingredients. We can now help your company move further up the protein value chain by turning raw animal blood into high-value protein fractions.

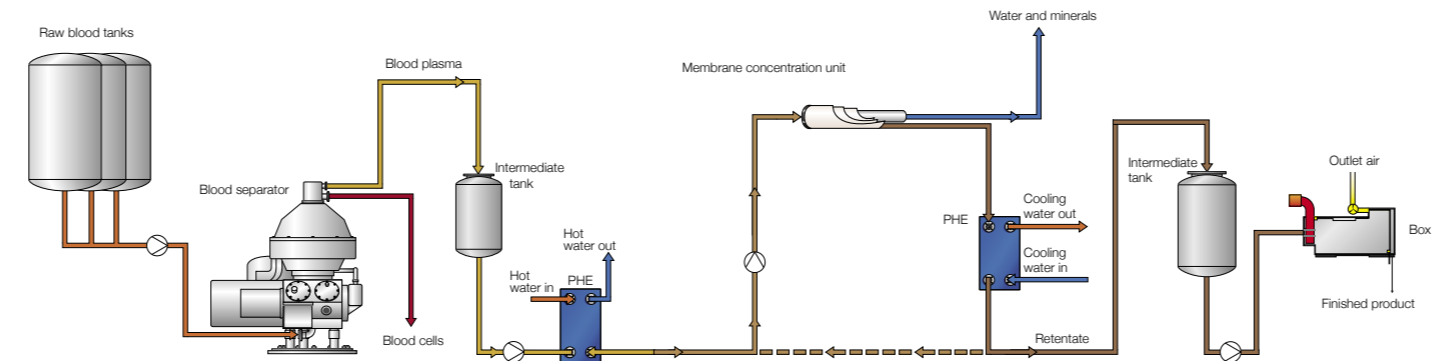
This makes us the natural choice for companies that want to establish an effective working relationship with an experienced specialist in this field.

Benefits

An Alfa Laval AlfaBlood continuous blood processing system enables you to:

- Move your company into new, high-value segments within the food industry.
- Provide ingredients that are in great demand in the food industry to bind water and fat.
- Produce high-quality plasma via controlled processing.
- Use less energy and water in processing operations, thus cutting back on operating costs.
- Benefit from sanitary design standards that leads to maximum prime protein recovery.
- Achieve maximum, high-value output with a minimum of manpower.
- Reduce the environmental impact of your plant operations.

Diagram of a typical AlfaBlood installation for processing animal blood into edible proteins



An AlfaBlood installation enables you to process virtually all kinds of water-free, strained blood collected from veterinarian-approved pigs and cattle.

This raw blood must be collected according to local regulations.

As soon as the blood has left the animal, an anti-coagulant is added to reduce the blood's natural tendency to coagulate.



If the raw blood is to be transported to a central production facility, it must be strained and cooled to 3 – 4°C (37 – 39°F). If the blood is processed on site, this can take place at either at low temperatures or at room temperature.

To remove any hair or other waste material, the raw blood is always passed through a strainer with a mesh of 200 – 500 microns. Once these contaminants have been removed, the blood is pumped to a specially designed high-speed centrifuge for separation into plasma and red cells. The best separation is achieved when shear effects are kept to a minimum and there is no air or water in contact with the raw blood. This results in plasma with a yield of 52 – 60%.

The plasma is then fed to an intermediate tank and cooled to 3 – 4°C (37 – 39°F) to prolong the shelf life of the proteins. The plasma then passes to an ultra-filtration unit with a spiral membrane for fractionation

and additional concentration. The plasma contains up to 1.5% salt and as much as 90% of this salt is now removed along with the water. This concentration normally takes place at temperatures of 25 – 45°C (77 – 113°F) and boosts the protein level from about 7% up to 25% depending on the quality of blood.

Higher filtration temperatures increase throughput but also result in conditions that tend to encourage bacterial growth.

Refrigerated plasma has limited shelf life but can be frozen in a flake freezer for sale as concentrated plasma, or dried using hot air. Drying makes it possible to ensure that the protein chains retain the desired characteristics and can be digested by humans.



Keep cooling

To limit bacterial growth in both the raw blood and in the plasma, it is important to maintain strict control of temperatures. Such blood products are normally cooled to 3°C (37°F) prior to storage or transport.

This cooling takes place in a sanitary-standard plate heat exchanger, using brine, ammonia, nitrogen or glycol as the cooling medium.

Self-cleaning blood separator

Alfa Laval self-cleaning separators allow long running times and result in increased yield. The separators provide better control of the colour of the plasma and also feature an automatic Cleaning-In-Place (CIP) facility that helps keep manpower costs down.

Each separator is fitted with a hermetically sealed bottom inlet that prevents the ingress of air and also keeps shear effects to a minimum. This also significantly reduces any haemolysis of the blood.

Hygiene management

The processing of raw blood only involves heating to 25 – 45°C (77 – 113°F). Turning it into edible proteins for human consumption or ingredients for pet food and the aquaculture market therefore requires careful control of bacteria to prevent the end products being contaminated.

The Alfa Laval AlfaBlood system is designed to provide extremely effective end-to-end hygiene management, and is equipped with CIP modules

Processing advantages add up

An Alfa Laval AlfaBlood system ensures you

- A highly versatile processing set-up
- Stringent hygiene management
- Rapid, gentle processing under controlled temperatures, ensuring the best possible protein functionality
- Plasma separation with an exceptionally high yield
- Controlled protein concentration with effective removal of salts
- Easy upgrade/extension path to enable you to cope with changing needs.

for automatic cleaning of the most hygiene-critical parts of the installation.

Concentration by hybrid membrane

In combination, nanofiltration and ultrafiltration can be used to concentrate animal blood plasma. During this filtration process, the membrane holds back the desired amount of minerals, removes the water and increases the yield.