

Production of collagen/gelatin from fish skin in the Faroe Islands



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Gelatin history



- 5000 years ago: the **Egyptians** used gelatin as **glue**
- 1803-1815 (Napoleonic Wars): the **French** used gelatin as a **source of protein**
- 1818: the **first gelatin company** was established
- 1833: a **patent** for the manufacture of **hard gelatin capsules** was granted
- 1845: the first **patent** for a **gelatin dessert** was granted
- 1897: the gelatin dessert **JELLO** was introduced
- 1930: a machine for the manufacture of **soft gelatin capsules** was invented
- 1930: the famous **gummy bears** were introduced
- 1950: **marshmallows** became extremely popular
- 2009: the total gelatin production was **326,000 tons**

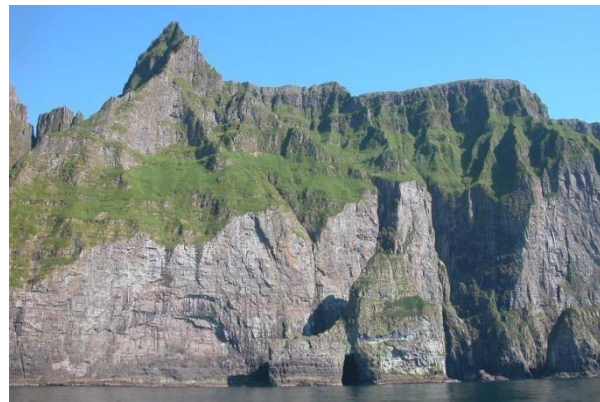
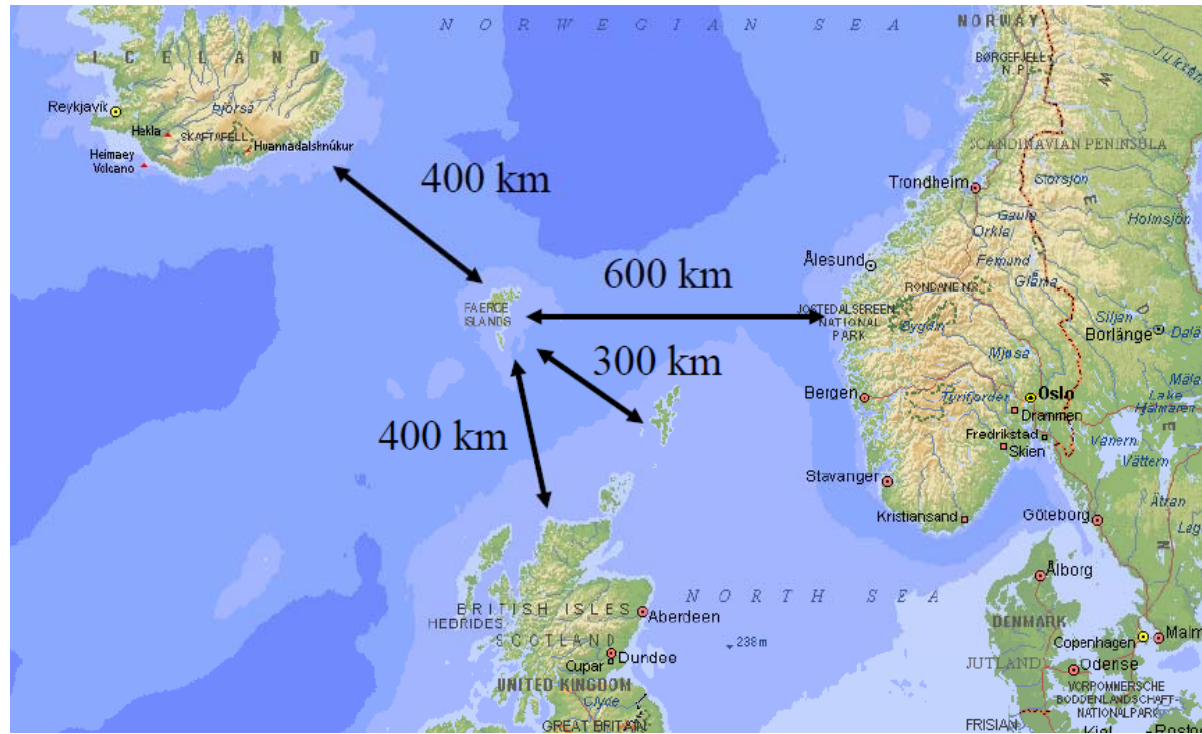




Seanergy was founded

- **Fish gelatin** has been extracted from fish skins **since 1960 in Canada**
- Only **small commercial volumes** are available (**~2,000 tons**)
- The **Faroese gelatin history started in 2005**
- The Faroese research centre and fishing industry were **looking for partners**
- **Junca Gelatins confirmed their interest in 2006**
- **A production plant** was established in the Faroe Islands in **October 2008**

Faroe Islands



Seanergy



- **Located in Eiði, Faroe Islands**
- **Joint venture between Juncà Gelatins and Biotech Invest**



Juncà Gelatines



- **Located in Banyoles, Spain**
- **Founded in 1947**
- **Family business**
- **Mammalian gelatins and hydrolyzed collagen**
- **Has the know-how from 60 years of experience**





Ownership

Sharecapital: 8 mill. DKK

Shareholders:

Junca Gelatines, Spain

Biotech Invest, Faroe Islands

- The Eik Fund
- Filleting factory
- Fishmeal factory
- Shipowners
- Service Company
- Staff

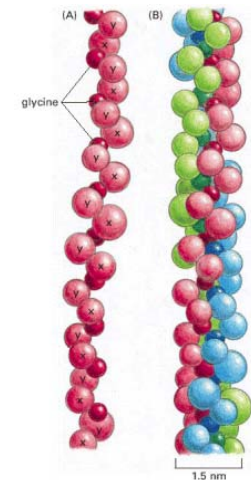
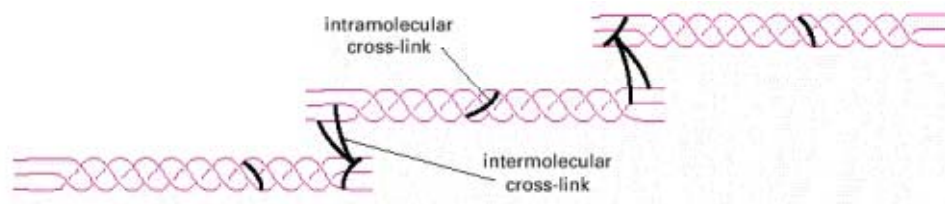
Raw material

- **Collagen** is the **major component of fish skin** and bone
- **Skin from deep water fish** such as **cod, haddock** and **saithe**
- Obtained from **local fish factories**



Collagen

- Composed of **three α -chains** that are **twisted around each other**
- The **α -chain** is about **1000 amino acids** long
- Collagen is **insoluble in water** due to the **covalent cross-linkages**



- **Collagen peptides/gelatins** are obtained by the **hydrolysis of collagen**

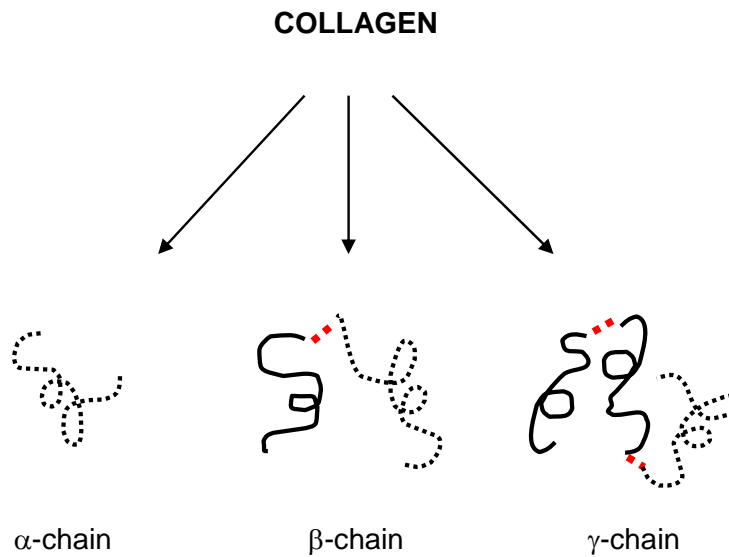
Production

- **Cutting**
- **Washing**
- **Pretreatment (acid/alkaline)**
- **Extraction (neutral/acid pH/enzym)**
- **Filtration/Centrifugation**
- **Concentration/Evaporation/Sterilization**
- **Drying**



The final product

- A mixture of polypeptide chains with different molecular weights
- α -chains, β -chains, γ -chains and components with **higher** and **lower** molecular weights



Commercial interest in gelatin

- **326,000 tons of mammalian versus ~2,000 tons of fish gelatin**
- Gelatins from **cold water fish species** are known to have **lower gel strength**, as well as **lower gelling and melting temperatures** compared to **mammalian gelatin** due to a **lower content of the imino acids**

Amino acid	Type A gelatin	Type B gelatin	Cold water fish gelatin
Hydroxyproline	91	93	60
Proline	132	124	96

Applications

- **Health**



- **Food**



- **Tablets**



- **Cosmetics**





Marketing situation in 2009

- **Bottom line remained negative in 2009**
- **Small volumes** were exported to **Thailand, Japan, Taiwan, Malaysia, USA, Singapore, UK and Norway**



Bottom line

- **Price** for fish collagen peptides/gelatin: **10-12 euro/kg**
- **Value of 80 tons** of collagen peptides/gelatin is **800,000 euro (~7 mill NOK)**
- **80 tons of collagen peptides/gelatin** can be produced from about **800 tons of fish skin** (~27,000 tons of cod/saithe/haddock)
- Production capacity: **3-5 tons/batch** (one batch/48h)



Positive aspect: Japan

- **Our contacts are very positive** on the introduction of our product
- Their **main worry** is the plant **capacity** and **raw material availability**
- **Sales** in the **Japanese market** can mean **several hundred tons**



Positive aspect: Thailand

- After **evaluation of the quality** of the product
- A **health distribution company** has **confirmed their interest** in becoming **exclusive agent** for our product in the **Thai market**
- **Similar approaches** are taking place in the **Taiwanese** and **Korean markets**



Positive aspects: EU

- **In EU, the ongoing evaluation of products: Functional foods keeps collagen on the list as an health ingredient**
- **After evaluation of the visco-elastic properties, a drug delivery company has confirmed their interest in using our product**



Thank you for your attention!