Animal rennet

Ad hoc meeting on plant and animal derived enzymes Joint Dossiers

18th September 2020

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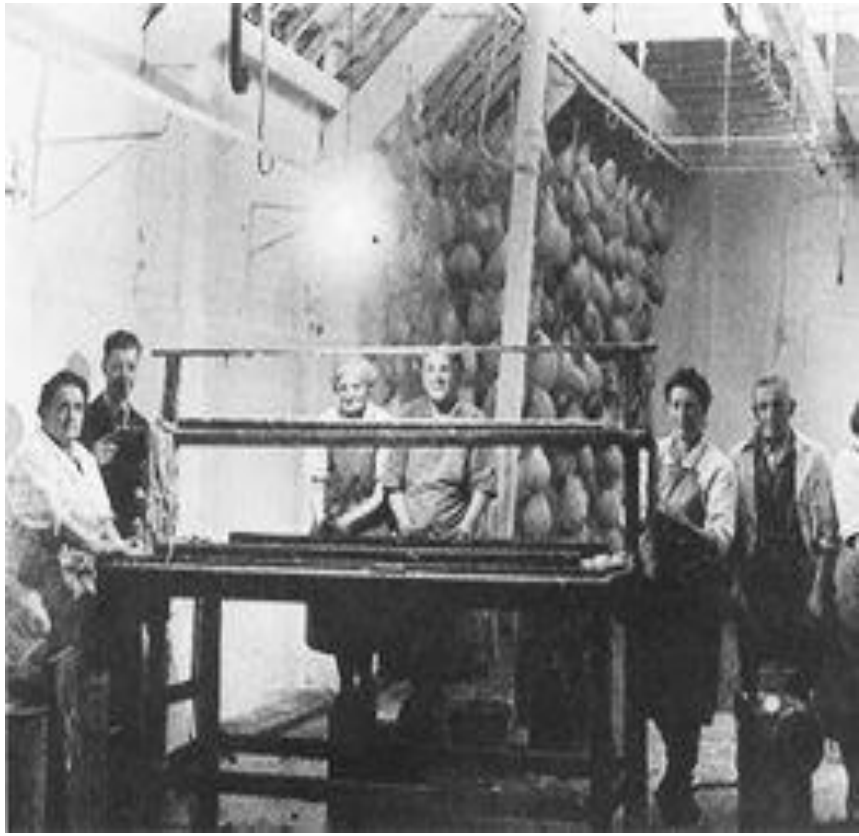
Introduction to rennet

Rennet: A traditional product

- Animal rennet, like cheese, has a very long history, beginning in antiquity.
- It was discovered thousands of years ago that ruminant stomach tissue had the ability to coagulate milk, resulting in the separation of cheese curd from whey which could then be drained away, leaving the semi-solid fresh cheese. It was probably often dried bits of such tissue that were used to bring about the coagulation of milk.
- In 19th century literature, it is described how dried stomachs were rolled into sausage shape, after which a slice was extracted in water to produce a portion of liquid rennet.
- The industrial production of animal rennet began in 1874
- Rennet thus became the first enzyme of all to be industrially produced. A few years later, such rennet was commonly used internationally, and several producers were established.



Picture source: history of Chr. Hansen, the 1st 145 years

Rennet: mandatory use in traditional cheeses

Rennet is legally the only coagulant that can be used in certain cheeses.

2 examples from France:

- Decree n ° 2011-701 dated 20 June 2011 relating to the protected denomination "Bleu de Gex haut Jura" or "Bleu de Septmoncel":

‘Only rennet made from calf abomasum is allowed.’

- Decree n ° 2007-822 of May 11, 2007 relating to the controlled label of origin “Comté”:

‘The only authorized additions are (…) rennet made from calf abomasum’

Mandatory use – no alternative

Size of market (estimation)

- Approx. 2 M tons of cheese is produced with animal rennet within the EU annually
- Approximatively 10 millions of tonnes of cheese are produced in the EU in total (Eurostat, 2017)
- Until the 1970s almost all cheese was made with rennet (with some marginal exceptions)

Waiving of toxicological studies

The difficulty in calculating the normal consumption of source material

- (4) With regard to the toxicological properties of enzyme preparations, the SCF guidelines indicated that food enzymes which are derived from **edible parts** of (non-genetically modified) plants and animals are generally considered as posing no health problems. According to the guidelines no special documentation for safety needs to be supplied provided that the potential consumption under normal use does not lead to an **intake of any components which is larger than can be expected from normal consumption of the source as such**, and provided that satisfactory chemical and microbiological specifications can be established.

- How can we estimate the 'normal consumption' of the source?

Normal consumption of the source

Ways in which stomach material can enter the food chain:

- Stomachs as an ingredient
- Stomachs used directly in cheesemaking
- Stomach material from rennet paste
- Stomach from rennet (in scope of the application)

Stomachs as a food ingredient

Stomachs as a food ingredient

Example from French supermarket: tripes a la mode de caen:

Beef stomach and foot : 73%

Source: E-leclerc, available online https://www.e-leclerc.com/ , last consulted in July 2020

Stomachs as a food ingredient

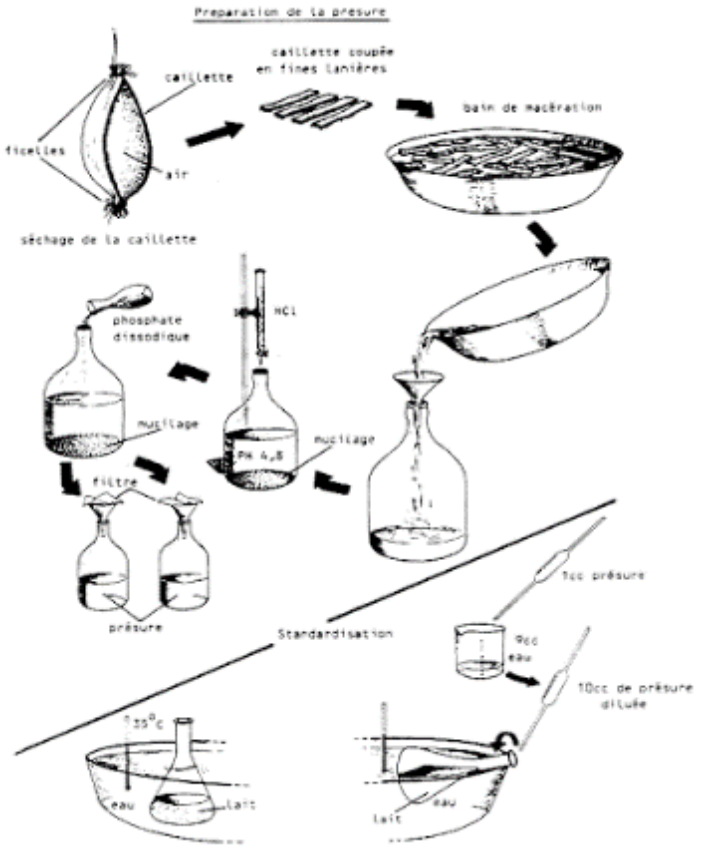
It is apparent that the variation in intake between countries is very wide.

Source: EFSA database (details in annex 1)

- High consumers in EU surveys: Romanian adults ➔ mean 0,06 g/kg bw per day with a standard deviation of 0,22 – 95th percentile of 0,49 g/kg bw per day
- 2 surveys with amount of consumers in double digits: Adults in Czech republic (57 consumers out of 1666 subjects) and Romanian adults (137 consumers out of 1254 subjects)
- Mean in those 2 surveys: between 10-60 mg/kg bw.day

Stomachs used directly in cheesemaking

Stomachs used directly in cheesemaking



a) Obtaining abomasum

The abomasum should preferably be obtained from calves that have not been weaned

b) Preparation of the abomasum

Wash and remove veins and fat.

The abomasum is then inflated with air (…) and hung in a dry, ventilated place. Complete drying must take place after approximately 1 month of storage.

c) Maceration

The dried abomasum into thin strips of approx. 5 mm wide.

They are then put to macerate in whey or deproteinated whey (called 'recuite' in French) with lactic acid bacteria that acidify the preparation.

After maceration the preparation is filtered and added to milk for cheese production at a rate of about 0,5 to 1 litre of preparation per 1000 litres of milk.

Almost no material is separated during the last filtration step, meaning the whole stomach material is ‘dissolved’

An older process to obtain a similar preparation has been described by the FAO (see picture opposite)

- Source: of picture. LAMBERT J.C., 1988. La transformation laitière au niveau villageois. Rome, Italie, FAO, 73 p. (Production et santé animales) [the text has been translated and shortened to relevant steps, full text available here: http://www.fao.org/3/x6934f/X6934F03.htm, last consulted in May 2020]

Stomachs used directly in cheesemaking

- Used mainly in the production of 2 French cheeses: Comte and Beaufort

Yearly cheese tonnage produced with vells (Industry estimate):

- Comte: 25,000 tons
- Beaufort: 5,0000 tons

Production of a coagulating/starter culture preparation using the vells:

Amounts:

- The amounts used are 1 to 5g of vells per litre of lactoserum, which is then added at 0,5 to 1 litre per 1000 litres of milk, meaning with a rough calculation 0,5 to 5g of vells is used to make 100 kilos of cheese.
- If there is no material lost, that would mean an estimated amount of around **5 to 50 mg/kg cheese**. We can anticipate that some amount will be separated with the whey, meaning the real amount left in the cheese must be somewhat lower.

Rennet paste

Stomach: Use of rennet paste

Certain cheeses with protected denominations in Italy, Spain and Greece and must be produced using rennet paste.

Most of the production with rennet paste takes place in Italy.

Rennet paste is prepared as follows:

- The raw material is whole stomachs including their content (clotted milk containing lipase).
- The next step is grinding the whole stomachs with their content and adding salt.
- A few grams of this paste is then taken, suspended it in water, filtered through a cloth to separate the biggest particles and the turbid suspension obtained is then added to the milk vat to curdle.

Part of the stomach tissue enters the milk.

Rennet paste

- Rennet paste is used primarely in the manufacture of Italian-type cheeses, it is used in more minor amounts in France, Spain, Greece. Some Italian cheeses are made using rennet paste

Italy

- Annual Italian cheese production made with rennet paste: 4000 tonnes/year
- Rennet paste used for this production: 180.000 kg, containing 20% salt

France

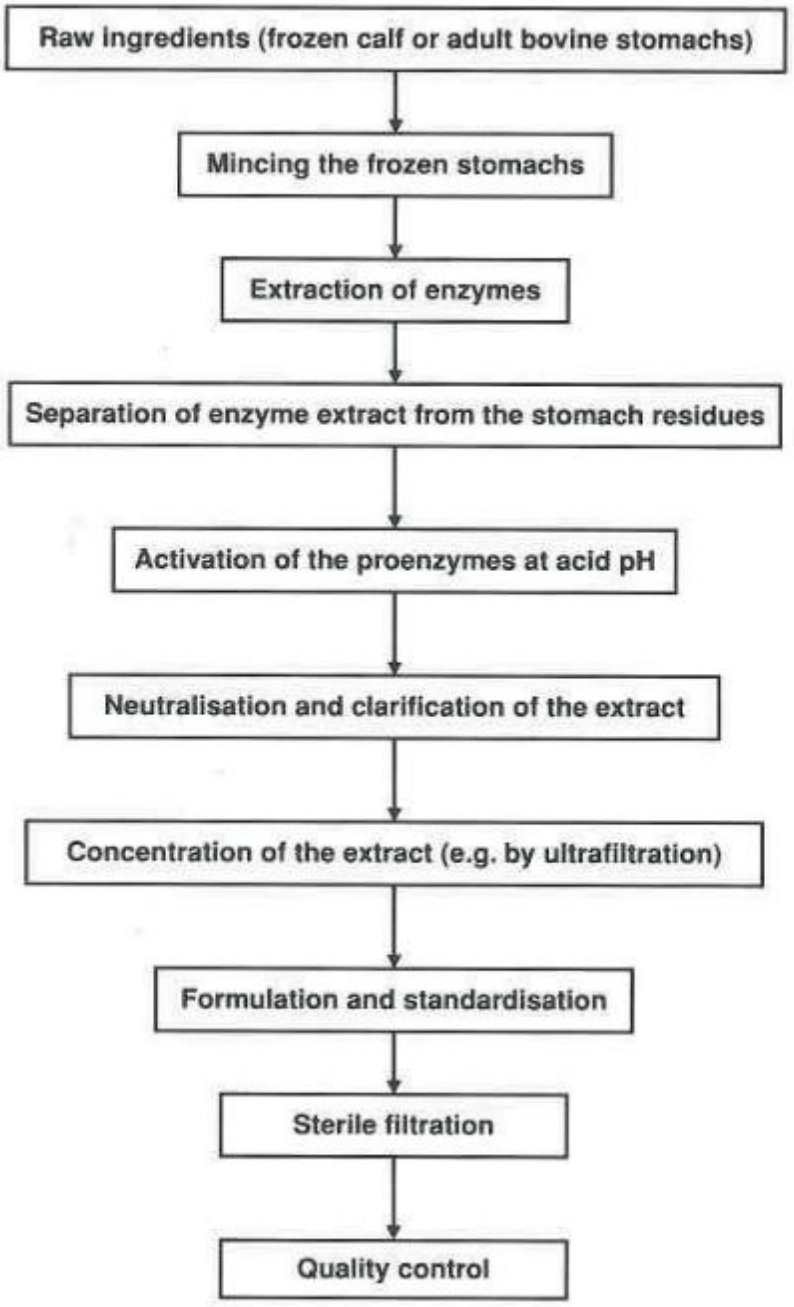
- Annual French cheese production made with rennet paste: 25 tonnes/year
- Rennet paste used: 10.000 kg

From literature: 20-25g grams of rennet paste are used in 100 litres of milk, containing 23% salt

By simple division: approximately **2-4 g stomach material are used per kilo cheese**. In the same way as traditional rennet, part of this amount probably leaves with the whey meaning the actual amount in the final cheese must be somewhat lower.

Rennet

Rennet production



Separation process

Consumption of material from source from rennet

- Rennet is a very traditional enzyme, and necessarely some material from the source will be carried over into the cheese
- However, rennet is so traditional that it can't be considered as a 'new source' for this material
- From the joint file, a calculation using the buget method had found a maximum of 3 mg TOS/kilo body weight per day
- Extremely conservative calculation
- We will in all probablity make new calculations that are more realistic.

Sources of intake of stomach material

Source of stomach material in diet	Material in mg per litre milk	Amount of cheese produced in the EU with material (estimates)
Stomach used directly in cheesemaking	0,5-5 mg material/kg milk	30,000 tonnes/year
Stomach material from rennet paste	200 – 400 mg material /kg milk	4,000 tonnes/year
Stomach material from commercial rennet production	Between 1 and 16 mg TOS/kg milk (from the joint dossier)	2,000,000 tonnes/year

Conclusion

Conclusion

- That rennet is derived from an edible raw material is not in doubt
- Our conclusion is that toxicity studies are not needed as intake of the source though rennet does not significantly add to normal expected consumption
- It should also be considered that the use of rennet is so traditional that in any case nothing new is added to the diet
- We believe the data will show that all rennet products are produced with substantial equivalent processes (as mentioned in Commission implementing regulation 562/2012)
- Data packages will be submitted by each manufacturer covering the points EFSA raised in March 2020
- To avoid disturbing the market and to maintain current situation in most member states, we anticipate that rennet will be covered by a generic entry

Annexes

1. EFSA numbers

How much is consumed ? All subjects

EFSA intake database for bovine stomachs:

Chronic Food Consumption Grams per kilogram of body weight per day (g/kg bw per day) - All Subjects

Levels:

L1	Meat and meat products
L2	Animal other slaughtering products
L3	Mammals other slaughtering products
L4	Bovine other slaughtering products
L5	Bovine stomach

Mean consumption in available surveys: between 0 and 0,06 g/kg bw per day

Thank you for your attention!