Good Manufacturing Practices: Coagulants
Traditional Preparation of Animal Rennet

• Coagulants derived from the abomasum of a calf, kid or lamb which is fed on milk only.

• These may be contaminated by pathogenic bacteria:
  Arising from *poor animal hygiene* or;
  Arising from *poor hygiene during processing*.

• However it may also be possible to *reduce the risk of presence or growth of pathogenic bacteria* during processing.
Traditional Preparation of Animal Rennet

- The processes described in the GGHP include:

  In traditional practice, the abomasum...may be dried, salted or frozen to preserve it prior to extraction of the chymosin enzyme.

  It is chopped or prepared as a paste (including the stomach contents) and macerated in a brine (typically 10 - 20% salt w/v and pH 4.5-5.0).
# Fate of Pathogens in Rennet Preparations

<table>
<thead>
<tr>
<th>Organism</th>
<th>pH</th>
<th>% Salt</th>
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</thead>
<tbody>
<tr>
<td><em>Listeria monocytogenes</em></td>
<td>5.00</td>
<td>10</td>
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<tr>
<td></td>
<td>4.50</td>
<td>20</td>
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<td><em>Salmonella</em></td>
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Non-thermal Survival Model @8°C

[www.combase.cc](http://www.combase.cc)
Animal Rennet: Primary Production

• Good manufacturing practice begins with healthy animals. The abomasum should be taken from a milk-fed animal which is in a good state of health.

• Milk used to feed the animal should not be contaminated with veterinary medicines.

• Both mother and calf/kid/lamb/etc should be free from signs of diarrhoea or infectious disease.

• For more information, see:

  GGHP: “risk analysis for primary production”
Preparation of the Abomasum

• The abomasum should be removed carefully to avoid contamination.

• Reject the abomasum where it is damaged.

• The abomasum should be light brown in colour, with white fat, but without gas.
Traditional Preparation of Animal Rennet

• Abomasa can be dehydrated by drying or smoking but: avoid contamination by insects or their larvae.
• Abomasa should be stored in a dry container, they can be covered with salt, or brined.
• It is recommended to use abomasa within 1-2 years, for technological reasons.
• Store in a cool place, with an appropriate quantity of salt.
• The preparation should be acidic, with appropriate colour:
  Light gold (rennet extract) or;
  Light brown (rennet paste)
Traditional Preparation of Vegetable Rennet

There are many different species of plants identified as milk coagulants (eg *Cynara*).
Coagulant is prepared from *Cynara* by:

- collecting and drying the flower,
- maceration of the pistil in water (eg for 4-8 hours)
- filtration
- immediate use or cold storage for up to 7 days to prevent the growth of harmful bacteria.
Traditional Preparation of Vegetable Rennet

Plant material should be free from contamination with:

• pesticides
• mycotoxins
• other chemical pollutants
• microbiological contaminants
• physical contaminants

Photo: Isidoro Jimenez
Traditional Preparation of Vegetable Rennet

This can be achieved by:

• Careful selection of plant material
  Undamaged plants; clean & free from signs of pest activity
  Sourced from areas which are free from chemical pollution

• Drying or rejection of wet or mouldy plant material

• Dry storage conditions

• Good personal hygiene (eg hand washing)

• Use clean equipment

• Use potable water
Bought-in Rennet Preparations

Hygiene is just as important when handling rennet that is bought-in from a manufacturer.

• Obtain rennet from a reputable supplier.
• Where possible, obtain a certificate of conformity from the manufacturer.
• Store according to the manufacturers instructions. (Protect dried abomasa from moisture)
• Use clean equipment to measure out rennet.
• Exceeding a best-before date will not pose a risk to food safety... but it may lead to slower coagulation.