

Individual Quick Frozen Gooseberries

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Agricultural Processing Brochure

South African farmers facing current economic realities are searching for new options to maintain and expand their businesses. One of the many opportunities to grow markets, turnover and profits is to add value to farm produce. Options need to be selected carefully based on sound information and knowledge of the opportunities presenting themselves.

Introduction:

Product group: Gooseberries

The gooseberry is a fruit in the of very hardy spiny bushes of the genus *Ribes Grossularia* of the family: *Grossulariaceae*. Synonyms include Feverberry, Feabes, Carberry, Groseille, Grozet, Groser, Krusbaar, Deberries, Goosegogs, Honeyblobs and Feaberry.

Gooseberries are best adapted to areas with cool moist summers. They are grown mainly in central and northern Europe, especially Britain. The gooseberry shrubs grow between 1 - 1,75 m high, with many branches, spreading prickles, and small, three- or five-lobed, hairy leaves. The flowers are green and hang singly or in pairs from little tufts of young leaves. The berries may be red, green, yellow, or white, hairy or smooth and are eaten fresh or in preserves. The berries are oval in

shape with a tart taste.

The yellow gooseberries have the richest flavour for dessert. The red berries are generally more acidic. The fruit is used for tarts, pies, sauces, chutneys, jams, and desserts, and also for preserving in bottles. Good quality gooseberry wine very closely resembles champagne.

Product description: Individually quick-frozen gooseberries

Fresh gooseberries are individually quick frozen (IQF) to produce a product that maintains its individual identity and gives the perception of "fresh fruit". This makes it ideal for inclusion into muffins and other bakery products as well as fillings. Frozen gooseberries can also be incorporated into a mixture of other IQF berries.



Frozen gooseberries are prepared from fresh berries and must comply with the specifications".

Process description:

Harvesting of quick frozen berries

Gooseberries are mainly harvested by hand, but mechanical harvesters have been developed. Hand picking is more selective but very labour intensive. The hand-picked berries are placed in sling bags and emptied into large sacks or palletised containers for transport to the processing site. The berries should be handled with great care at all times to prevent bruising, crushing and spoilage.

Trimming and snipping of gooseberries

Mechanically harvested berries often contain excessive amounts of plant material and other impurities. This should be removed in the field or before delivery to the processing plant.

The freshly harvested gooseberries are therefore trimmed to remove any remaining plant material. This can be done by hand or by passing the gooseberries through a mechanical snipper. Other impurities can be removed on vibrating screens or by aspiration

Sorting of gooseberries

This is done to select the best suitable raw materials for manufacturing the value-added end product. The snipped gooseberries are spread on sorting tables for inspection. All damaged, infested, over mature and green berries are removed.

Washing of gooseberries

The berries are washed in agitated or non-agitated waterbaths filled with potable water. Agitation is caused by recirculation of the water. The water must be changed regularly to minimise the chance of any contamination

spreading. Washing has the additional benefit of cooling the berries down.

Individual quick freezing of berries

Individual quick freezing (IQF) preserves the intrinsic characteristic of whole berries and causes less cellular damage and results in final product with a firmer texture. The products can be frozen as loose pieces before packaging or in carton boxes. Pre-packaging freezing is preferred because it is faster. Individual quick-freezing can be done with fluidised bed air-blast freezers or with cryogenic freezers:

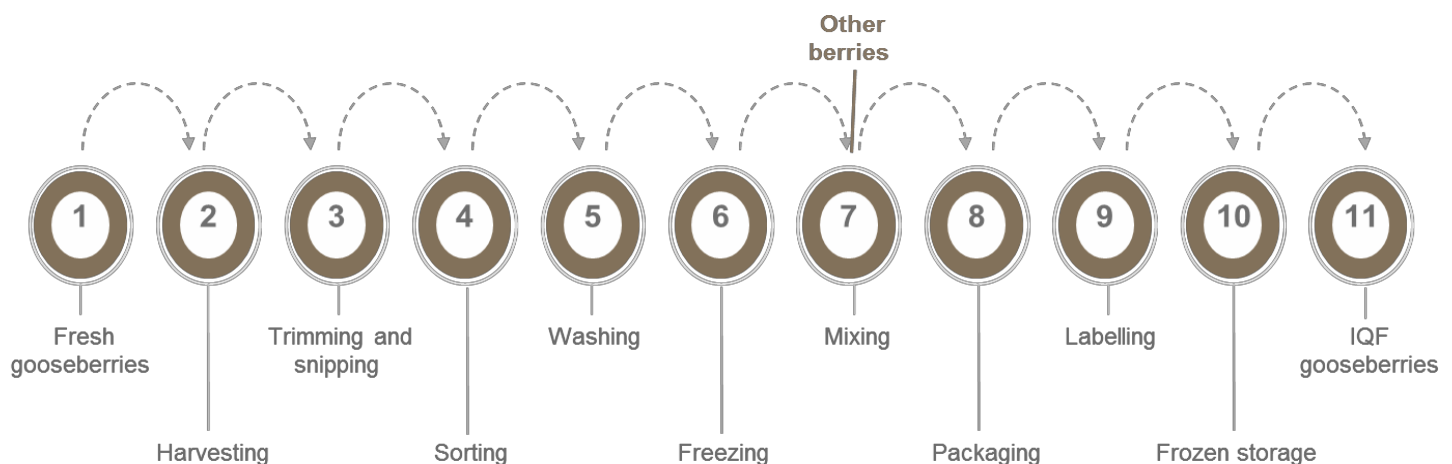
Fluidised bed air-blast freezer: The product is frozen with air at -30 to -40 °C that is passed at high velocity (2 - 5 m/sec) up through a 3 - 14 cm thick bed of berries contained in a trough (V) with a perforated base. The product being frozen shows turbulent movement (like a liquid - free-flowing). Products are frozen within 3 - 15 minutes. The berries may be given a thin ice glaze to minimise freezer burn and clumping during freezing.

This involves wetting the berries before passing it through the pre-chilling zone of the freezer so as to freeze a thin ice layer around each berry. The glazed berries are then moved to the colder zone of the freezer to complete freezing.

Cryogenic freezers: This involves freezing of food with liquefied or solidified gasses (refrigerants). Most common refrigerants are solid carbon dioxide and liquid nitrogen (boiling point of carbon dioxide is -79 °C and liquid nitrogen -196 °C). The refrigerant is in close contact with the food and rapidly removes energy from the food to absorb its latent heat of vaporisation or sublimation, to provide high heat transfer coefficients and



Process overview



Fast facts

Individual quick-freezing can be done:

Fluidised bed air-blast freezer:

“The product is frozen with air at - 30 to -40 °C.”

Cryogenic freezer:

“This process involves freezing of food with liquefied or solidified gasses (refrigerants).”

rapid freezing. The choice of a refrigerant depends on the price and availability of the carbon dioxide and nitrogen. Liquid carbon dioxide is sprayed onto food to form a layer of snow on the product that evaporates (sublimates) on contact. In liquid-nitrogen freezers, packed or unpacked products are put on a perforated belt moving through a tunnel, where it is cooled by gaseous nitrogen and then frozen by liquid-nitrogen sprays. The temperature is allowed to equilibrate at the required storage temperature before it is removed from the freezer. Production rates of 45 - 1350 kg/h are possible. The use of a gaseous nitrogen freezer is advantageous because of its greater flexibility, relative low capital costs, smaller weight losses from

dehydration of the product, rapid freezing, exclusion of oxygen during freezing, low power consumption and rapid start-up and no defrost time. The main disadvantage is the relatively high operating cost of replenishing the refrigerant.

Mixing of frozen berries and currants (optional)

Different types of frozen berries and currants may be mixed together with the gooseberries to produce interesting new product varieties. The combination of the various frozen berries used, depends on the end use of the product and the requirements set in Regulations regarding control over the sale of frozen fruit and frozen vegetables in the Republic of South Africa, R727/1998.

Packaging of individually quick frozen gooseberries

Packaging is defined as the containment of a food product in a protective barrier that prepares goods for transport, distribution, storage, retailing and end-use.

The frozen berries are immediately packed into suitable containers and hermetically sealed. A great variety of packaging containers may be chosen from, provided the packaging material and seal are moisture proof and can withstand the frozen storage conditions. Suitable retail containers include polyethylene and polypropylene bags and tubs. Large quantities can be packed in drums or barrels, which can be either steel with a plastic lining or fibre drums. Cartons with a wax or plastic-lining (bag-in-box packaging) and an exterior protective overwrap can also be used. The packaged product should be stored at around - 23 °C. Temperature fluctuations should be avoided since this reduces the storage life due to the rapid build-up of water on the internal surface

of the package and subsequent clumping of the individual fruit.

Vacuum packaging would add to the preservation of the berry flavour and colour and thus extend the keeping quality of the product.

Labelling of frozen fruit and vegetable products

Frozen fruit and vegetable products must be correctly labelled according to the requirements set out in the Regulations regarding control over the sale of frozen fruit and frozen vegetables in the Republic of South Africa.

Legislation involving fruit products

Labelling in South Africa is controlled by legislation. Anyone who wants to use the information provided in this document must familiarise him/herself with all the applicable laws that apply to the producing, processing, manufacturing and storage of the products referred to in this document

Other processing options:

Below is a list of other processing options for gooseberries not covered in this report:

Canned gooseberries are prepared from fresh berries, harvested at full size but prior to softening and colour development. The berries may be water packed for Danish and fruit fillings or sugar packed for dessert fruit.

Gooseberry concentrate is basically gooseberry puree that has been concentrated. The gooseberries are pulped, depectinised and concentrated to produce a product that can be used in confectionery products, beverages, sauces, flavourings and fillings and in fruit juices after dilution. The product is preserved by freezing.

Gooseberry puree is prepared by crushing and pulping fresh gooseberries. Some of the seeds and skin may be removed by filtration, depending on the final use of the product.

The puree is preserved through pasteurisation and freezing.

Gooseberry juice may be manufactured from fresh or frozen gooseberries. Gooseberry juice is mainly used in juice blends since there is a limited demand for pure gooseberry juice. Gooseberries for juicing should be harvested at full size, but before turning colour.

Energy Advisory Services

Eskom's role is to aid the client with basic information in the decision making process. Thereafter the Eskom Advisor will fulfil the role of energy advisor as part of the team that the farmer selects.

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Eskom's Energy Advisors, in regions across South Africa, offer advice to business customers on how to optimise their energy use by:

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- Understanding their electrical systems and processes.
- Investigating the latest technology and process developments,

including electric infrared heating and drying systems.

- Analysing how to reduce energy investment costs.
- Optimising energy use patterns in order to grow businesses and industries.

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For more info visit:

<http://www.eskom.co.za/sites/idm/Business/Pages/AlternativeFunding.aspx>

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The aim of this document is solely to provide the reader with some basic information on agro processing in order to understand the extent of the operations involved. The reader should familiarise him/herself with all applicable laws that apply to the product growing, storage, processing and manufacturing. This information concentrates on the sequence and steps involved in the processing of the selected product and explain the reason and necessity of each step. It is not a complete reference document on which calculation and design shall be based, nor was it ever intended to be.

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