Canned Blueberries

Agricultural Processing Brochure

Brochure content:

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: Blueberries

Blueberry is the common name of the genus *Vaccinium* in the heath family, *Ericaceae.* Various species of blueberries exist, varying from shrubs less than 0.3 m tall to large bushes more than 5 m in height. The sweet-tasting berry contains 40 to 50 small, soft seeds and often has a powdery coating. Most blueberry species are indigenous to North America, where 90% of the world's blueberries are produced.

Blueberries mature two to three months after flowering and are harvested throughout the summer season when the solids content is approximately 15%. Blueberries are mainly consumed fresh, but can also be used for cake toppings, pie fillings and in baked products.

Other processing options include juicing, cooking or concentrating.

Product description: Canned blueberries

Canned blueberries are prepared from fresh berries and must comply with the specifications as set out in the *Regulations relating to the grading, packing and marking of canned fruit intended for sale in the Republic of South Africa - R1079/1976.*

The blueberries may either be packed in water or sugar syrup. The water packed product can be used as pie fillings and toppings. The sugar syrup packed berries can be used as dessert fruit.

"Canned blueberries are prepared from fresh berries and must comply with the specifications".

Process description:

Harvesting of blueberries

Blueberries are picked manually or mechanically when the berries reach the soft ripe stage and a solids content of around 15%, since flavour and aroma development is of prime importance to the end product.

This requires a harvesting method that inflicts the minimum damage to the product. The berries may be picked by hand and placed in flat trays for transport and/or further

processing. However, with the improved cultivars that ripen more uniformly and the advanced technology of harvesters, mechanical harvesting has become a more viable option for large producers and processors.

It is advisable to harvest berries in the early morning to eliminate or at least reduce the need for additional cooling. The time between harvesting and processing should be kept to a minimum, and the harvested product must be handled with great care at all stages prior to processing.

Field sorting and trimming of blueberries

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 to reduce waste loads. The freshly harvested berries are therefore sorted and trimmed on sorting tables with the help of separation screens to remove defective fruits, any remaining plant material and foreign materials such as stones. Trimming and sorting is usually done manually while destemming can be performed mechanically by passing the berries through soft rubber-coated rollers.

Cooling and cleaning of blueberries

The berries must be cooled to between 0 - 5 °C as soon as possible after harvesting, and kept in this temperature range until processing commences. Hydrocooling is the most effective method of achieving rapid cooling. Water has the advantage of acting as a cooling, cleaning and transportation medium.

The trays of berries are dumped gently into a tank containing cold, potable water (0 - 5 °C). The water acts as a cushion against any possible mechanical damage, while cooling and cleaning the berries. The berries are transported by the water via a trough or closed pipe from the tank to a vibrating, sloping riddle or screen on which it is sprayed with potable water to complete the cooling and cleaning process. From here the clean berries are delivered to the sorting tables/belts via perforated racks/conveyors that also allow draining of cleaning water. The cleaning water may be recirculated after filtration and treatment.

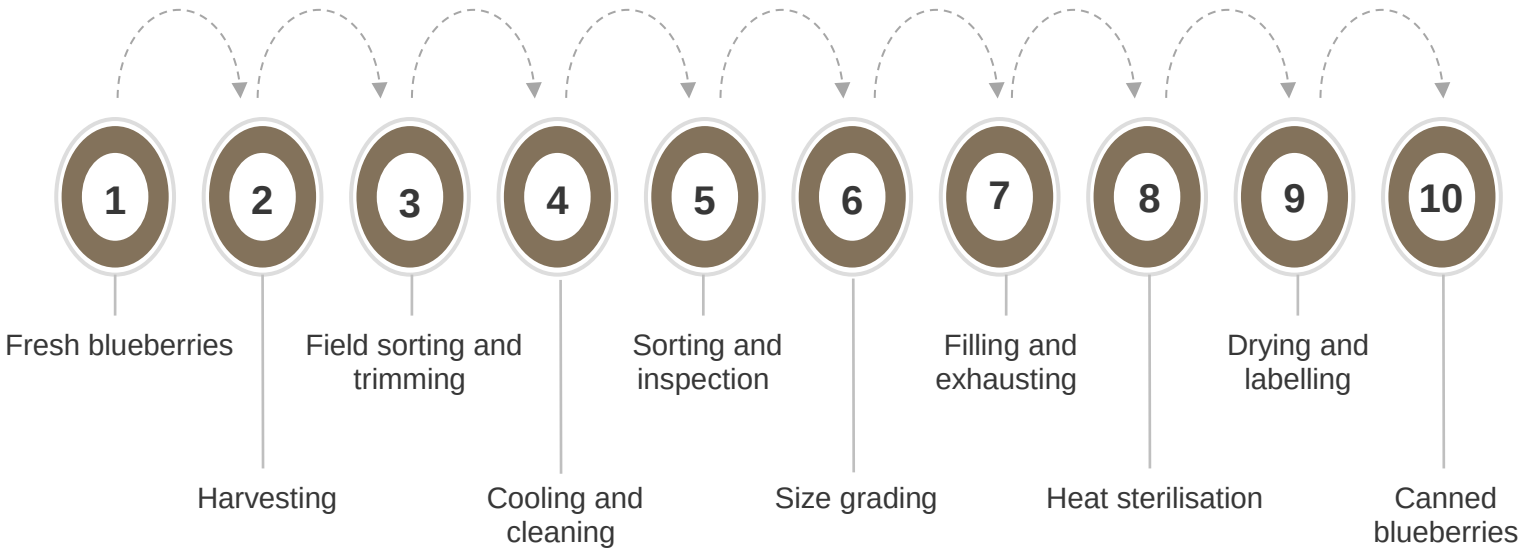
Although forced air cooling can be used instead of hydro cooling, it requires additional cleaning (aspiration and screening) steps to remove foreign matter. The trays of berries are placed in a chamber where chilled air is drawn into the cold room through the trays. The temperature of the fruit must decrease to between 2 - 4 °C within one hour of harvesting.

Berry fruits are not usually washed, unless they contain significant impurities, in which case washing is performed by passing the fruit on belts under low-pressure water sprayers.

Sorting and inspection of blueberries

This is done to select the best suitable raw materials for manufacturing the value-added end-product. The clean blueberries are spread out on sorting tables and inspected for defects. Any damaged, spoilt, immature or misshaped berries are removed manually. Berries that have not previously been destemmed, are diverted to destemming rollers.

Process overview



Please note the **Disclaimer** on page 4

Fast facts

Time and temperature combinations:

116°C

The period of **10 – 20 minutes** at 116-121ºC is necessary to reach a temperature of 85ºC in the centre of the can

85°C

TAKE NOTE: It is strongly recommended that each processor adapts the processing time and temperature to his own unique circumstances as prescribed by a heat processing specialist.

Size grading of blueberries for canning

The blueberries are graded according to size using slat riddles. This is important since different size groups have different heat processing requirements. Processing a mixture of different sizes would lead to a non-uniform product with berries of varying degrees of softness.

Filling and exhausting of cans with blueberries

Exhausting involves the partial or complete removal of the remaining air or oxygen in the headspace of a can to prevent corrosion of the tinplate and spoilage of the product.

The blueberries are packed into suitable tin cans. Water or heavy sugar syrup (50 - 55 °Bx) is added as a packaging medium. The filled containers are exhausted with steam at 77 - 95 °C for 5 - 6 minutes. The steam reduces the oxygen in the headspace that may cause some undesirable changes in the product (discoloration). The exhausted containers are sealed. Upon cooling, the steam forms a partial vacuum in the headspace.

Heat sterilisation of canned blueberries

Sterilisation refers to the complete destruction of all micro-organisms in food. Most food products are, however, only commercially sterile.

This means that the degree of sterilisation only destroys pathogenic and toxin-forming organisms as well as all other types of organisms which, if present, could grow on the product and produce spoilage under normal handling and storage conditions. The canned blueberries require a heat sterilisation treatment to stabilise the product. Sterilisation is done in retorts. A great variety of retorts are available, ranging from still and agitated batch retorts to continuous retorts or hydrostatic cookers. The choice of retort influences the time of exposure needed to stabilise the product.

The still retorts are loaded, closed and steam is pumped into the closed vessel. The time/temperature combination depends on the type, the. size and dimensions of the container. An approximate time/temperature combination of 10 - 20 minutes at 116 - 121 °C is necessary to reach a temperature of 85 °C in the centre of the can. Agitated batch and continuous retorts have more efficient heat transfer mechanisms and thus require much reduced processing times, but have higher capital costs.

Labelling of canned fruit products

Care must be taken to ensure compliance with the regulations with regard to composition and correct description of the contents according to regulations relating to the grading, packing and marking of canned fruit intended for sale in the Republic of South Africa.

Cooling and drying of cans

The cans must be water-cooled as soon as commercial sterility of the product has been reached to prevent over-cooking of the product. This could spoil the appearance, flavour and texture of the product.

Cold potable water mist spray is used to cool the cans to 37 °C. Casing and stacking of cans at temperatures substantially above 37 ℃ may result in quality deterioration known as "stack-burning".

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 are other processing options not covered in this report:

Blueberry concentrate is produced through the evaporation of blueberry puree to reduce the water content. The concentrate may be aseptically packed or frozen to extend the storage life.

Blueberry jam is produced from fresh or frozen blueberries, which are cooked with sugar to produce syrup with the desired solids content. Upon cooling, the syrup forms a soft gel.

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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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Literature and reference sources:

- Arthley, D. & Ashurts, P.R. (eds) 1996. Fruit Processing. London: Blackie Academic & Professional.
- Falconer, S. 2003. SA farmers capitalise on "berried" treasure. Farmer's Weekly, 28 March 2003.
- Fellows, P. 1988. Food Processing Technology: Principles and Practice. Chichester: Ellis Horwood, Ltd.
- South Africa - Agricultural Products Standards Act (No 119 of 1990) and regulations. Pretoria: Government Printers Energy
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