

## Handling Guidelines for Avocado — 1995 Season

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### **BACKGROUND**

A detailed technical report on the 1994 commercial temperature and quality surveys has been prepared. This technical report is available from the PPECB on request.

The aim of this document is to formulate practical procedures, technical evaluation procedures and further experimentation.

### **PICKING, PRECOOLING AND ROAD TRANSPORT**

#### **Picking maturity**

Optimum fruit moisture content is clearly defined in the fruit quality regulations applied by the Agricultural Products Standards (APS) personnel of the PPECB. APS personnel are keen to assist growers and exporters in the correct interpretation and application of moisture content as maturity index.

Moisture content must never exceed 80 % at time of picking. Exporters must also be very careful not to extend the shipping period too late into the season.

Moisture content is also directly related to optimum storage temperature regime. This data is considered when applying shipping temperatures and growers should therefore keep SAAGA informed of moisture content readings.

#### **Removing of field heat**

Time and temperature between picking and marketing are, apart from picking maturity, the two most important postharvest quality determining factors. The sooner the product is pre-cooled and shipped, the better.

Recommendations:

- The picked fruit must be taken to the packhouse at least every four hours and must never be allowed to stand in the orchard and, — even worse — be exposed to warm temperatures and direct sunlight.
- The field heat must be removed on arrival at the packhouse by keeping the fruit at 16°C prior to packing.
- Fruit temperatures must not increase between picking and packing.

## **Packing**

Avocados must be treated and packed as soon as possible after picking but in any event on the same day of picking. Fruit should never be accumulated on the floor at ambient temperatures.

Requirements:

- Cold stores must be PPECB registered.
- The correct date codes must be stamped in such a way that it can be easily read. The best position is in the left upper corner on the front of the carton.

## **PRECOOLING AND ROAD TRANSPORT**

### **Precooling**

The packhouse cold store is the only link in the whole cold chain that can precool the fruit. The cold store operator must load and manage the store correctly to obtain effective precooling without inducing chilling injury but still to cool as close as possible to the specified temperature.

Requirements:

- The PPECB (APS) inspector will record the pulp temperatures at time of inspection on the inspection form.
- Avocados must be precooled prior to loading into the refrigerated truck, to such a temperature that, on arrival in the port, it will not be warmer than specified in the section "During transfer" below.

### **Refrigerated road transport**

The most important aspect regarding refrigerated motor transport (RMT) is that the unit is not designed or built to cool the product. Heat leakage into the unit may even result in the fruit temperatures increasing during transit.

Requirements:

- The RMT must have a valid PPECB certificate.
- The temperature control must be on delivery air.
- The RMT must be precooled for at least three (3) hours to the required transport temperature prior to loading.
- The exporter/packer must ensure that the temperature setting is correct and that air is actually delivered at the selected setpoint.
- The exporter/packer must record the actual pulp temperatures (of each and every pallet) and the driver must countersign the document.

## **Offloading in port**

Well planned logistics are essential to ensure quick transfer and minimum temperature increases.

Requirements:

- Loading depot and PPECB Operations Manager in the port must be notified of delays in arrival of RMT's.
- RMT's must arrive at the loading depot before the cut-off time.
- Split loads and local market fruit in the same RMT cause delays and temperature increases. This must be avoided.
- Off loading must take place in such a way that a minimum temperature increase takes place.

*The PPECB will:*

- Check the RMT and the following temperatures prior to opening of the doors:
  - Temperature set point
  - Temperature registered on recorder chart
  - DAT — Delivery air temperature
  - RAT — Return air temperature
  - Validity of the PPECB certificate.
  
- Take the following pulp temperatures during off loading:
  - In pallet at the front (door end)
  - In centre pallet
  - In pallet at the back
  - Inside a randomly selected pallet All the above temperatures and respective pallet numbers will be recorded.
  
- Reject the avocados for export if:
  - The RMT is not registered with the PPECB (does not comply to minimum standards to maintain the cold chain) and the fruit is warmer than the specified initial shipping temperature (Durban and Port Elizabeth) or the Cape Town holding store intake temperature. A maximum deviation of + 5°C will be applied by PPECB Port Operations personnel.
  - The pulp temperatures can either be warmer than specified in the section "During transfer" below, or colder than 1,0°C below the specified clip-on-unit or holding store intake temperature.

-The fruit will be older than 12 days at ETD of the vessel if the ETD was not changed after commencement of packing for the specific vessel. This period will be extended by the number of days the vessel is delayed should this happen.

### **During transfer**

Quick direct transfer from the RMT or cold store into the container to minimise temperature increase is essential. The product must be protected against the elements and must not be subjected to extreme temperature and humidity conditions.

Requirements:

- Pulp temperatures at loading of a port hole container in Cape Town or a conventional ship in any port must not exceed the following per fruit age group to ensure optimum quality on arrival at the market. Fruit age is calculated as the number of days between the date code stamped on the carton and the holding store intake cut off date. (A part of a day rounded downwards, for example 3 days 14 hours becomes 3 days).

-Avocados 3 days and less old (deadline\*) = 4°C above holding store intake temperature.

-Avocados 4 to 6 days old = 3°C above holding store intake temperature

-Avocados 7 days and older = 1°C above holding store intake temperature

- The 1994 commercially monitored temperature and fruit quality results suggest that avocados 7 days and older can be containerised at 2°C above the optimum specified temperature. It must however, be pointed out that warmer loading called for intensive temperature management to counteract the possible ripening effects of old avocados loaded warmer than 1°C above specification.
- Pulp temperatures of Eastern Cape and KwaZulu/Natal produced avocados packed on the last day for the specific vessel may be 3°C warmer than the specified clip-on-unit temperature at loading of the container or conventional ship. All avocados produced in the Transvaal and all other avocados to be shipped ex Durban as well as Eastern Cape fruit to be shipped ex Port Elizabeth must not be warmer than 2°C above the specified clip-on-unit temperature. PPECB Operations personnel in Port Elizabeth and Cape Town will obtain a temperature record of avocados already loaded in the previous port(s). This will be evaluated and the necessary changes implemented.
- In the event of the vessel being delayed fruit age will be "rolled forward". This means that fruit that were packed as deadline will become "medium" (5-7 days) and "medium" fruit will become "old" (more than 8 days) fruit. This procedure will be followed because more time will be available to precool the fruit.

-Integral refrigerated containers cannot cool warm products. Avocados to be shipped in such containers must be at the specified shipping temperature at time of loading. A maximum pulp temperature deviation of + 0,5°C will be allowed.

-Warm fruit, i.e. fruit exceeding the temperature/age group, will have to be re-cooled

to the specific temperature prior to loading into containers. The fruit will be rejected if there is not sufficient time to recool to the above mentioned temperature per age group.

-Mixed date codes on the same pallet must be limited to the absolute minimum. Oldest fruit and warmest temperature on the pallet will be considered in the temperature management programme.

-Pallet sorting for specific containers must be avoided. This procedure can only result in temperature increases and quality variation.

*\*Deadline fruit are avocados (based on date code) packed on the last packing day for a specific vessel (i.e. fruit packed not more than 72 hours before the ETA of the vessel).*

## **HOLDING OF CONTAINER AND TTT**

Product temperature must be maintained after the container is loaded. This is very critical because any heat build-up cannot be removed by the in-transit or shipping equipment.

Requirements:

- The total Time Temperature Tolerance (TTT) that a container with avocados may be without cooling is three (3) hours.

-A maximum of 2 hours will be allowed between removing the container from the holding store or uncoupling of the COU to reconnecting to the vessel's cooling system.

-The holding store (Cape Town) and COU's (Durban and Port Elizabeth) must be set at the specified DAT. Portnet must record the DAT at least every 4 hours and PPECB must verify the function and correct temperature control at least once every 24 hours.

## **SHIPPING, VOYAGE AND DISCHARGE**

### **During loading and during the voyage**

A very strict temperature management programme must be followed by the Chief Engineer to minimise quality loss. It must however be remembered that:

- The DAT can only be controlled within the specified minimum and maximum temperatures.
- Pulp temperatures are not known during the voyage.
- The refrigeration staff must also take care of up to 800 other refrigerated containers on the vessel and cannot supervise the avocado temperatures 24 hours a day for 16 days.

### *Procedure*

- The PPECB gives verbal and written carrying instructions to the Master and Chief Engineer. (See attached letter to the Master).
- The brine in the cooling system must be reduced prior to loading of containers in order to deliver air at the correct temperature immediately after coupling of the last container.
- The temperature thermostat must be set to the correct temperature prior to loading.
- The container must be connected and cooling started immediately after completion of loading the specific row.
- The vessel (container and/or conventional) controls the DAT/RAT according to the PPECB instructions and reports to the PPECB at regular intervals. The first report must be received preferably within the first 24 hours but not later than 48 hours after departure from Cape Town. Thereafter temperature reports must be received not later than 12:00 on every Monday, Wednesday and Friday during the voyage.
- PPECB liaise with the industry representatives and formulate corrective measures if required.
- The PPECB informs the Chief Engineer (or the Master) of the required DAT temperature change.

### **During and after discharge**

There is no temperature control during this very critical period after discharge. The responsibility of the vessel also ends when the container is lifted from the vessel. It is therefore the responsibility of the importer or his agent to arrange immediate collection of the container. This is especially important for discharge in the port of Tilbury.

### *Procedure*

- The fruit must be put under cooling as soon as possible but within a maximum of 24 hours after discharge.
- Should the importer be unhappy with the condition of the fruit, a competent quality surveyor must file a report and complete the PPECB quality questionnaire.

### **CONCLUSIONS**

Correct picking maturity, handling and cooling prior to dispatch is absolutely essential because quality will continue to deteriorate despite the most optimum conditions being applied during storage and transport.

The cold chain must be applied within the specified tolerances. These tolerances cannot accommodate insufficiently precooled fruit or over-mature fruit.