GRADING MANUAL

FROZEN SQUASH
(Summer Type)

UNITED STATES DEPARTMENT OF AGRICULTURE
FOOD SAFETY AND QUALITY SERVICE
FRUIT AND VEGETABLE QUALITY DIVISION
PROCESSED PRODUCTS BRANCH

Frozen Squash (Summer Type)
June 1978

This manual is designed for Processed Products Branch personnel of the U.S. Department of Agriculture. Its purpose is to give background information and guidelines to assist in the uniform application and interpretation of U.S. grade standards, other similar specifications and special procedures.

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GENERAL INFORMATION

Summer squash develops fruit quickly after the blossom is set. Squash must be harvested while the fruit is immature and of small diameter.

Surface blemishes and defects may become a problem if squash is held too long or piled too deep. Blemished squash is usually lye-peeled to remove the outer portions of the damaged rind. Some squash (high quality) is processed without peeling.

Squash must be washed to remove particles of soil. If the squash is muddy, a scrubber might be necessary to loosen attached grit and make the squash acceptable. After washing, whole squash is conveyed to a cutting and trimming operation. Some processors trim the stem-end as well as the blossom-end of each squash. Other processors do not trim the squash but sort the objectionable material from the squash prior to packaging. Sliced squash is the most popular style of frozen summer squash. Other styles include diced, strips, and quartered and sliced.

Squash is blanched to destroy enzyme activity and promote good keeping qualities during storage. Additives including organic acids and calcium salts may be used in the blanch water to aid the retention of color and promote firmness.

Frozen summer squash is packaged in labeled and wrapped cartons, fiberboard cartons with polyethylene liners, tote bins or other large containers.

Frozen summer squash packed in tote bins or other large containers is individually quick frozen (IQF) to be repacked later. Excess water from inadequately drained squash might cause the squash to freeze in clusters. If a breaker is used to separate the clusters, damage in the form of broken units usually occurs. The squash should be at least 0° F at the time it is packed in large containers. This will also help prevent clustering.

VARIETAL TYPES

Any variety of squash (green, yellow or white) which has a soft rind and is harvested in an immature stage of maturity would technically qualify as summer squash. Commercial plantings grown for processing are mainly limited to yellow crookneck, yellow straightneck, yellow hybrids and zucchini. Several of the characteristics of each varietal type are listed below.

Yellow crookneck:

1. Long, narrow, curved neck;
2. Swollen blossom-end with seeds;
3. Deep-yellow to orange-yellow color;
4. Warty skin at maturity; and
5. Noticeable variation of diameters of slices.

Yellow straightneck:

1. Straight or slightly curved, thick neck;
2. Swollen blossom-end with seeds; and
3. Light-yellow color.

Yellow hybrids or "banana squash":

1. Milky-yellow color;
2. Straight, thick neck; and
3. Swollen blossom-end with seeds.

Zucchini or "Italian squash":

1. Oblong fruit; and
2. Dark-green to green color with a light-gray, mottled background.

STYLES

Sliced.

Its normal for the diameters of sliced zucchini, yellow straightneck and yellow hydrids to be more uniform than sliced crookneck. Diagonal slices and slabs are expected to occur in sliced crookneck squash. Most sliced squash is packaged for consumer outlets.

Cut.

The U.S. standards do not define "cut" squash. Therefore, consider all styles of summer squash, other than sliced, as "cut." Cut squash is packaged in small containers for consumer outlets. It is also used for manufacturing into other products such as soups and vegetable blends. Descriptions of some of the most common forms of cut squash are listed below.

Quartered and sliced zucchini. Zucchini squash is cut lengthwise into 4 strips (quarters) and each strip is sliced crosswise into units of approximately 1/2-inch thickness. Some small irregular slivers (chips) are present.

Diced zucchini. Zucchini squash is cut into units about 3/16 x 3/8 x 3/4 inch. Small irregular slivers (chips) are numerous.

Long-diced or strip-cut zucchini. Zucchini squash is cut into units about 3/8 x 3/8 x 1-1/2 inch or longer. Other cuts 1/4 x 1-1/4 x 1-1/2 are used. Small irregular slivers (chips) are numerous.

SIMILAR VARIETAL CHARACTERISTICS

The color of frozen summer squash usually varies among units in the same container. This is acceptable. Color variation is caused by: (1) a continuous fruiting period which produces mixed maturity fruit; (2) a difference between the color of neck slices and seed cavity slices; (3) fruit which receives direct exposure to sunlight and fruit which is shaded by plant leaves; and (5) available nitrogen in the soil. Consider frozen squash a mixture of varietal types only when it is objectionable, such as yellow squash mixed with zucchini squash.

FLAVOR AND ODOR

Cook squash to evaluate the flavor and odor. However, any odor that is noticeable in the frozen squash should be checked by cooking any "suspect" sample unit.

Consider flavor and odor that is less than desirable, but not objectionable, as "reasonably good." If the flavor or odor is objectionable, but the squash is edible, consider it as Substandard.

Follow Branch guidelines in the general file codes if the squash is inedible because of flavor or odor.

* Frozen summer squash is not a "good keeper." This is especially
* true of frozen squash packed in tote bins. Conditions to be
* alert for include bleached color, lack of taste or flavor, and
* poor flavor associated with positive enzyme activity. Although
* frozen squash may test negative for enzyme activity at the time
* of packing, it is not uncommon to find positive enzyme activity
* after storage.

* Change.

COLOR

Yellow varietal type.

Immature yellow squash has a pale-yellow or white-yellow color to the rind, depending upon the variety. Mature squash usually has an orange-yellow color and warty rind. Yellow squash at a suitable stage of maturity for processing has a typical light-green to white seed cavity. Variation of color is characteristic of yellow squash. Peeled squash is usually more uniform in color than unpeeled squash.

Green varietal type.

Immature zucchini squash has a light-green to dark-green color with gray mottling. At times, it has a faint striped effect to the overall background appearance. Different strains of zucchini account for variation in color.

Green spots.

Yellow squash has a greenish-yellow color in the seed cavity of blossom-end slices and the flesh of neck slices. This greenish color is normal. However, dark-green, objectionable, wart-like spots may occassionally be found on the rind of yellow squash. If these green spots are encountered, lower the score given for the factor of color.

Repacking frozen squash.

Frozen squash has poor retention of color during storage. It has a relatively short "shelf life." Significant color change could occur during storage. If the color has changed during storage, and the squash is reinspected, the score for the factor of color must be changed from the original score assigned at the time of packing.

Yellow squash stored in tote bins, large polyethylene lined cartons, and three pound cartons could develop a "washed-out" color. A positive enzyme test might accompany the color change. Conditions to be alert for are white or milky-white spots on the rind with overall dullness and possibly "off-flavor."

Zucchini squash stored in tote bins could change color during storage. Conditions to be alert for in zucchini are bleaching of the overall brightness and the intensity of color.

DEFECTS

Earthy materials (sand, grit or silt).

* Squash fruit comes in contact with the soil during its growth. The
* type of soil that the squash grows on will influence the kind of
* earthy material that might be found in the frozen squash. Grit is
* a common defect of frozen squash. Conditions to be alert for are
* embedded grit in the rind and loose grit in the bottom of the
* grading tray.

* Scan the squash and liquid on the grading tray for any visible
* grit. Also, press a spoon against the bottom of the grading tray
* and move it through the liquid. A scratching noise indicates the
* presence of grit.

* If there is no visible grit, chew random units of squash that are
* cooked for the flavor and odor evaluation. Consider frozen squash
* as:

* Free of grit (grade A) when there is:

* 1. No visible grit in the liquid;
* 2. No visible embedded grit in the rind; and
* 3. No detectable grit when the cooked squash
* is chewed.

* A trace of grit (grade B) when there is:

* 1. Barely visible grit in the liquid;
* 2. Barely visible grit embedded in the rind;
* 3. Barely detectable grit when the cooked squash
* is chewed; and
* 4. No objectionable grit.

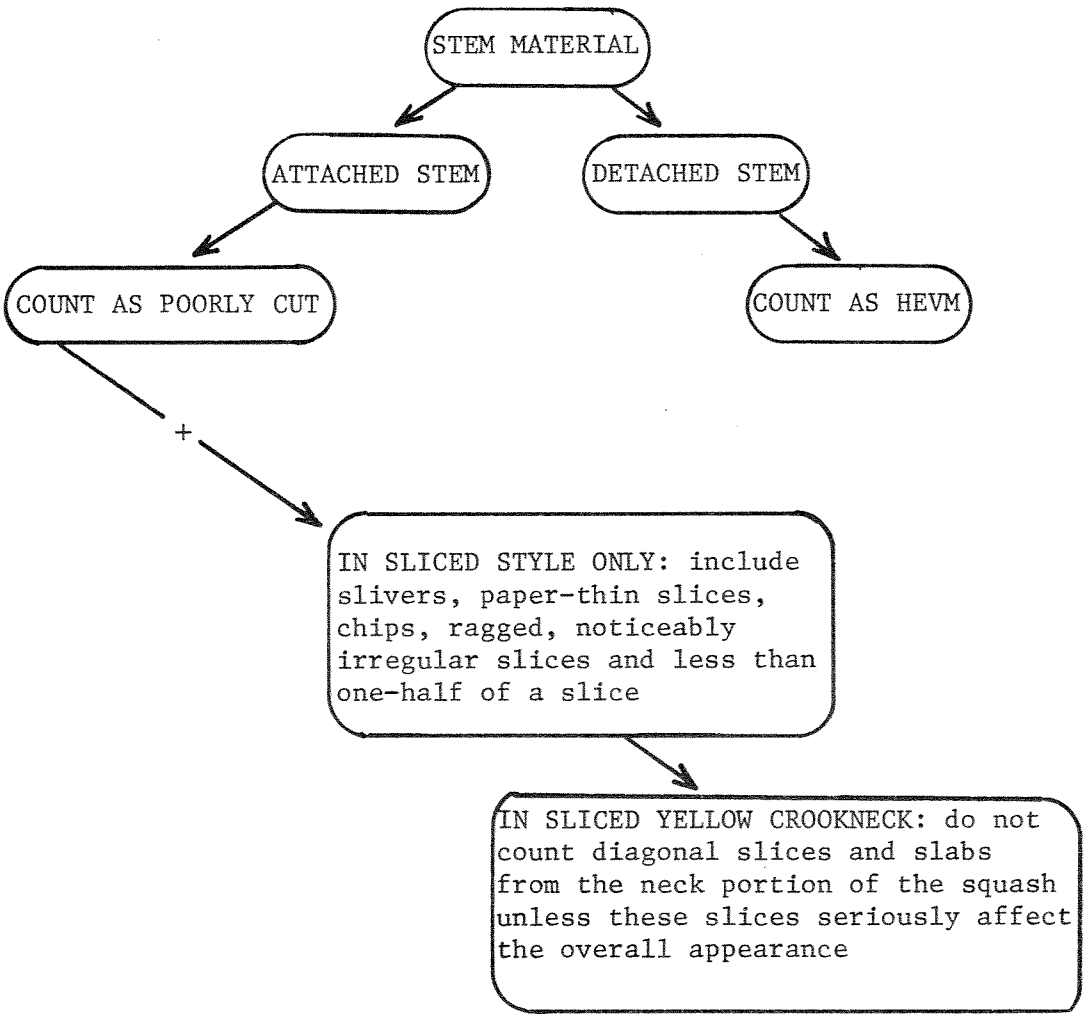
* Substandard when there is any objectionable earthy material.

* Change.

DEFECTS (continuation)

Poorly cut and harmless extraneous vegetable material.

Most processors trim summer squash before it is sliced or cut. However, some processors omit trimming. If the squash is not trimmed, as many of the stem-ends and blossom-ends as possible, are removed while the squash is on the sorting belt. The U.S. standards define "poorly cut" and "harmless extraneous vegetable
* material." Also, the photo-guides for frozen summer type squash illustrate the cutoff point for attached stems and detached stems.



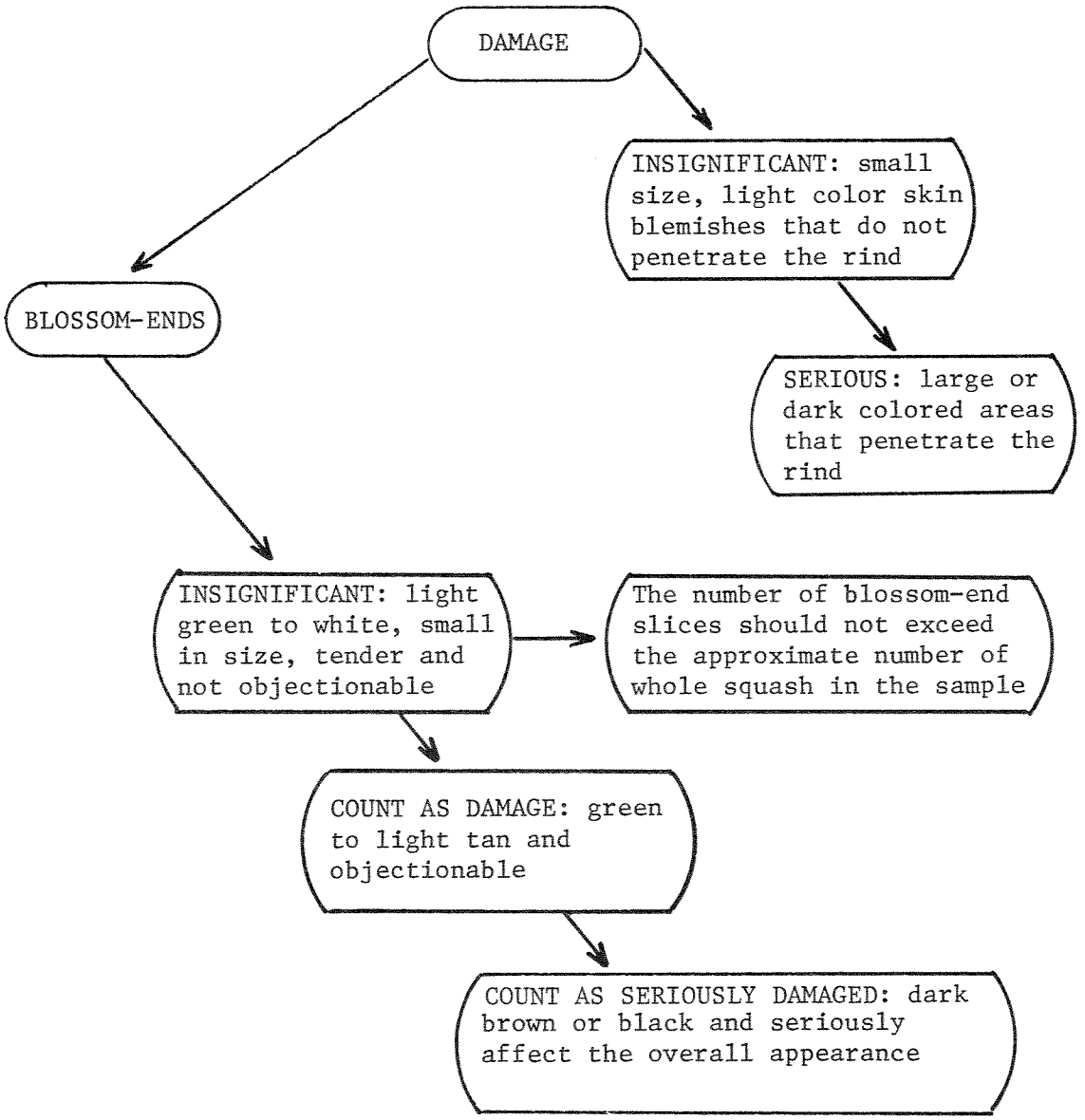
* IN CUT STYLES ONLY (QUARTERED AND SLICED, DICED, STRIPS, ETC): do
* not count chips and small irregular pieces (chaff) unless the
* squash is being packed to a buyers specification which requires
* that small pieces (as defined) meet an allowance provided in the
* specification.

* Change.

DEFECTS (continuation)

Damage.

There are two types of damage defined in the U.S. standards -- mechanical damage and damage caused by discoloration or other similar means. There is an allowance for each type of damage.
* Also, the photo-guides for frozen summer type squash illustrate "damage" defects. The information furnished below applies only to damage by discoloration or other similar means.

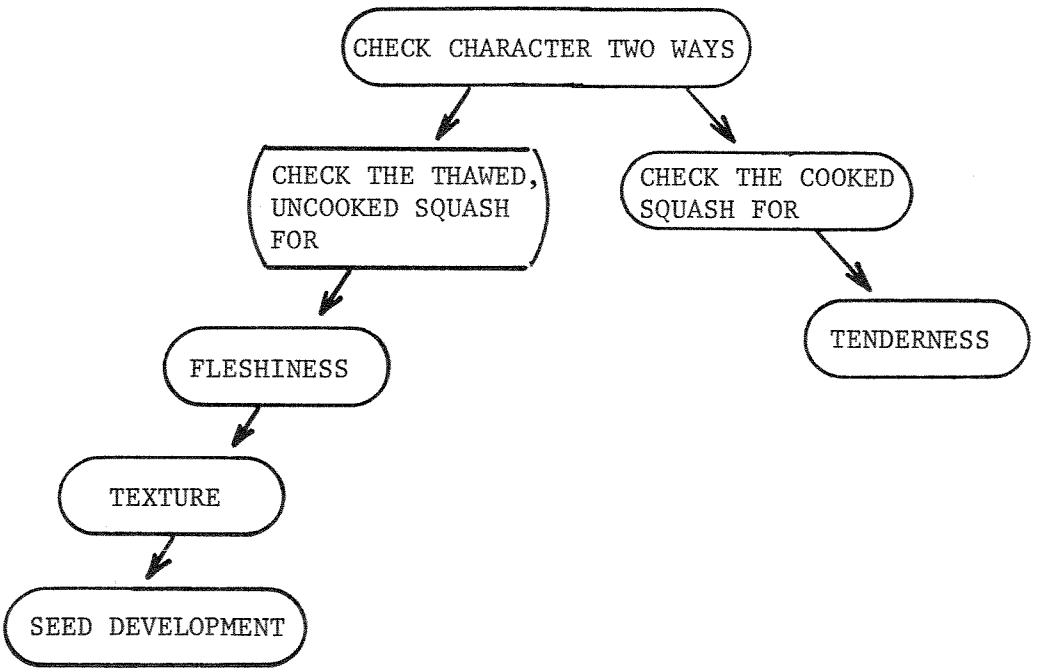


* Change.

CHARACTER

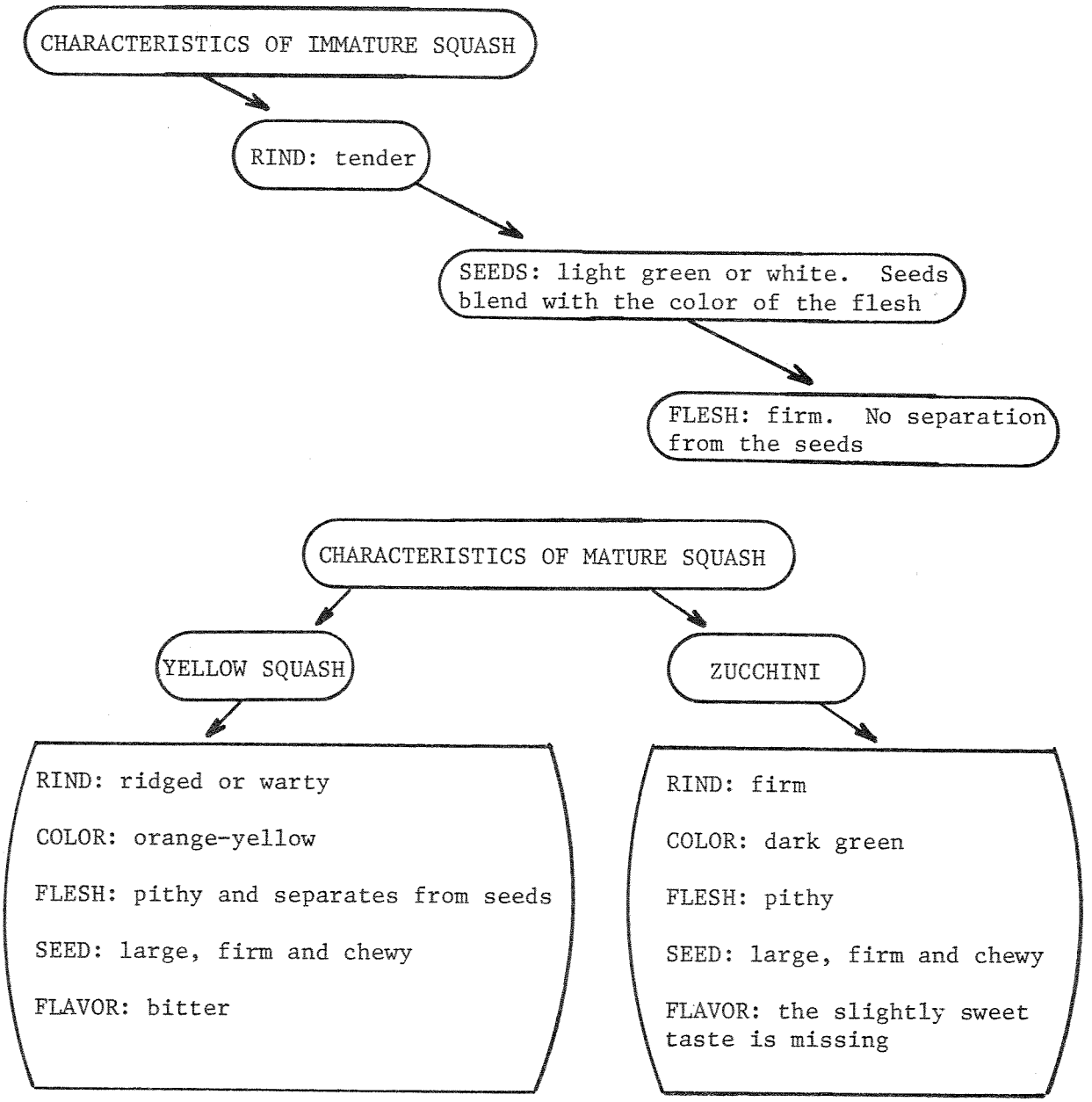
* The character of frozen summer type squash is directly related to
* the maturity of the fruit and the way in which the frozen squash
* is handled and stored. Sliced squash, processed from fruit which
* is too mature, could lose much of the flesh in the seed cavity.
* When the flesh in the seed cavity is lost, the squash resembles
* "onion rings." Also, immature squash which is not adequately
* drained prior to freezing could develop the same condition.

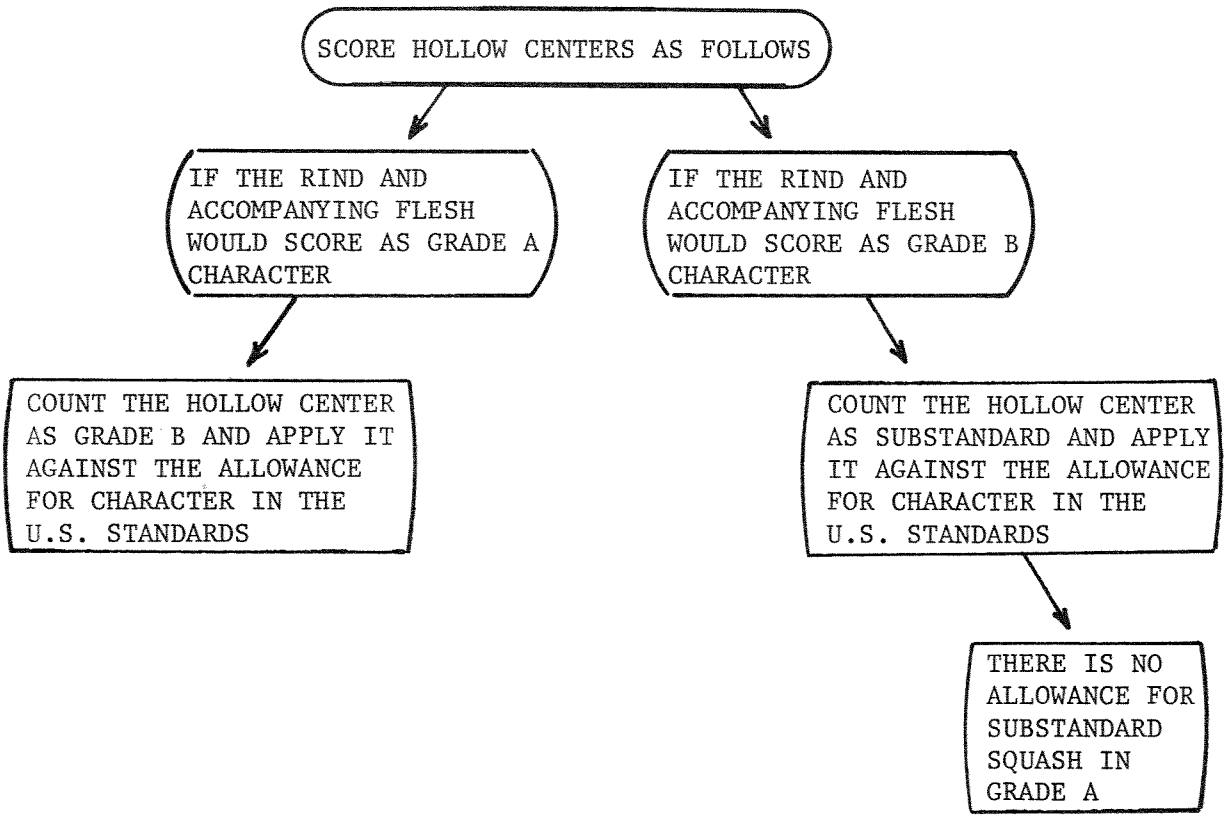
* Squash is sensitive to the freezing process. IQF squash, processed
* from immature fruit which is well drained prior to freezing, can
* be expected to have good character. If squash is frozen too slowly,
* such as tray freezing of three pound cartons, the character is
* usually affected. Conditions to be alert for are breakdown of
* texture and watery flesh after the squash is thawed.



* Change.

CHARACTER (continuation)



CHARACTER (continuation)

Frozen sliced squash with hollow centers is scored under the factor of character. Do not score hollow centers under defects. Flesh in the seed cavity of mature squash is pithy and shrinks from the seed. This leaves a weak structure to hold the centers intact. Rough handling causes further deterioration of the centers.