Corn, Sweet

Revised 2008

Thermal Properties

	English	Metric
Moisture, %	75.96	--
Protein, %	3.22	--
Fat, %	1.18	--
Carbohydrate, %	19.02	--
Fiber, %	2.70	--
Ash, %	0.62	--
Specific Heat Above Freezing	0.86 Btu/lb*°F	3.62 kJ/(kg*K)
Specific Heat Below Freezing	0.47 Btu/lb*°F	1.98 kJ/(kg*K)
Latent Heat of Fusion	109 Btu/lb	254 kJ/kg

Storage Conditions

	Fresh	Frozen on Cob
Temperature	32°F (0°C)	0°F (-18°C)
Relative Humidity	95 to 98%	Vapor-proof packaging
Storage Period	4-8 days up to 3 weeks	About 1 year
Highest Freezing Point	30.9°F (-0.6°C)	

There are two types of sweet corn that are stored fresh. Traditional sweet corn contains 3-5% sugar at harvest, which can be lost extremely rapidly by conversion to starch if the corn is not precooled rapidly and thoroughly to 32°F (0°C). Newer, 'supersweet' varieties of sweet corn contain 2-3 times more sugar than traditional sweet corn and, in the case of the (most common) sh2 types, the sugar-to-starch conversion is also inhibited. Supersweet varieties have become the dominant type produced in virtually all the major sweet corn producing regions of the U.S.

The high initial sugar content coupled with inhibited starch synthesis in sh2 varieties effectively more than doubles the potential storage life of sweet corn from 4-8 days to 2-3 weeks. However, supersweet varieties remain extremely perishable because sweet corn is among the highest respiring vegetable crops, and sugars are consumed in the process of respiration. The loss of sugar from sweet corn is about 4 times as rapid at 50°F (10°C) as at 32°F (0°C).

Sweet corn is very susceptible to water loss through the husk leaves, which draw water from the cob and kernels and cause the kernel tips to collapse or 'dent'. A loss of 2% moisture from sweet corn may result

in objectionable kernel denting. Sweet corn ears with the shanks trimmed almost flush with the butt and flag leaves removed are less susceptible to denting and thus more suitable for storage. The relative humidity in sweet corn storage should be maintained at 95 to 98% and can be helped by package icing.

High quality sweet corn has plump, tender, well-developed kernels, and fresh, tight, green husks. Sweetness is the most important quality factor in consumer satisfaction with sweet corn. All sweet corn varieties lose sweetness and aroma during storage, but the taste of traditional varieties becomes starchy while supersweet varieties eventually taste watery and bland. Storage life of traditional sweet corn is limited by loss of sweetness while, for supersweet corn, water loss and denting, followed by kernel toughening, are the most important negative factors limiting the storage life.

Increased interest in controlled atmospheres (CA) for sweet corn has been spurred by interest in using marine transport to export sweet corn from the U.S. to Europe and the Far East, which can involve transit times on the order of 2 weeks or more, rather than for storage. An atmosphere of 2% O_2 plus 10-15% CO_2 reduces respiration and sugar-to-starch conversion, and the elevated CO_2 also reduces decay and maintains the green color of the husk, extending the storage life of sweet corn by about 1 week.

Sweet corn is most commonly handled in wire bound wooden crates and, less commonly, in waxed fiberboard cartons or returnable plastic containers, all containing 4½ to 5 dozen ears. Sweet corn should not be handled in bulk unless copiously iced, and there should be ample air circulation, because the corn tends to heat throughout the pile due to its high respiration rate. Some sweet corn is prepackaged in PVC film-overwrapped trays with the ends of the ears trimmed and the husks partially removed to expose some kernels. The PVC film is highly permeable to O_2 and CO_2 and acts primarily as a moisture barrier.

Maximum quality retention requires precooling sweet corn to near 32°F (0°C) within an hour after harvest and holding ears at 32°F (0°C) during storage and marketing. Sweet corn can be pre-cooled adequately by vacuum cooling, but it must be wetted first and top iced afterward to minimize water loss from the husks and kernels.

Hydro-cooling by spraying, showering, or immersion in water at 32-37°F (0-3°C) is also effective, although it takes longer than vacuum cooling for the same temperature reduction if the sweet corn is packed before it is cooled. It is important to check cob temperatures during hydro-cooling to determine if temperatures are being lowered to at least 50°F (10°C). After hydro-cooling, top icing is desirable during transport or storage to hasten continued cooling, remove the heat of respiration, and keep the husks fresh.

Sweet corn can also be cooled with package ice and top ice in waxed fiberboard cartons. In a comparison of commercial cooling operations in Florida, package ice cooling, as commonly used for broccoli, was comparable to hydro-cooling and better than vacuum cooling in maintaining sweet corn quality during storage, probably due to residual ice in the cartons since the cooling rate was slower than for the other methods.

Decay is not usually a serious problem with sweet corn, typically occurring on the husk and silks when present. Trimming sweet corn ears can induce decay development on the cut kernels and other damaged tissues mainly by Alternaria, Fusarium, or Mucor fungi. Proper sanitation and temperature management are important to minimize decay in trimmed sweet corn. It is recommended that potable water chlorinated at 50 ppm, or pH 7, be used in order to avoid transfer of decay and pathogenic organisms during hydro-cooling of the products, and potable water should be used for making ice.

Freezing

Sweet corn is not normally stored fresh prior to freezing. Due to the rapid deterioration of quality, indicated by the conversion of sugar to starch and a loss of moisture, caused by field heat and high temperatures at time of harvest, sweet corn is processed as quickly as possible after harvesting.

Not all cultivars of corn freeze well and for advice on what cultivars freeze well for any particular area, the State Agricultural Experiment Station or Cooperative Extension Service usually have the desired information.

Automatic equipment is used for husking, washing, and cutting. Cut corn should be blanched for 1-2 minutes and rapidly cooled. Freezing can be on trays or metal conveyors, or in the case of cut corn, by IQF.

Frozen corn is sensitive to temperature fluctuations in the freezing range and off-flavors may develop. Thawing for reprocessing and packaging, such as canning, is not as harmful to quality as in some other products.

Corn-on-the-cob has grown rapidly in popularity as a frozen product. The cob can become off-flavored during freezer storage and may become "musty." Thus, more precautions must be taken in preparation, especially in the blanching process prior to freezing. The storage life is as much related to the degree of enzyme inactivation by proper blanching as it is to storage temperature. Practically all commercial frozen corn-on-the-cob show a positive test for the enzyme peroxidase in the cob center area. Off flavors can be developed by this enzyme activity in the cob which then could migrate out into the kernels.

A storage life of about 1 year can be expected for corn-on-the-cob at 0°F (-18°C). At a temperature of -10 to -15°F (-23to -26°C), the storage life could possibly be increased to 18 months. Lower temperatures would not be expected to significantly increase storage life beyond 18 months. The normal packaging material is polyethylene film of at least 3 millimeter thicknesses.

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