

the risks associated with price fluctuations. In addition to hedging there are several other trading techniques.

2.4.3 Shipment of cocoa

Cocoa is traditionally stored and transported in jute (or occasionally sisal) sacks containing 60–65 kg (132–143 lb) of dry beans. Jute sacks have a number of positive features: they are strong, stackable (do not slip over each other), breathable (allow moisture to pass through) and are made from natural biodegradable fibres. Sacks can be stacked directly into the hold of a ship (break bulk). This method has the disadvantage of requiring significant handling at the ports, which is both costly and time-consuming. Alternatively, sacks can be placed within ventilated shipping containers (12.5 t to a maximum of 18 t of beans per container).

Cocoa beans can also be transported in bulk. Loose cocoa beans can be placed directly into shipping containers (17.5–25.0 t of beans) or directly into the hold of a ship, similar to grain shipment (mega bulk). Up to several thousand tonnes can be transported in one hold. Bulk shipment methods are gaining in popularity, and it is estimated that about 70% of cocoa beans shipped to northern European ports now use one of these bulk methods.

2.4.4 Moisture movement during shipment

Cocoa beans can release water vapour during a voyage. There can be a 1% loss in weight (shrinkage) due to this release of moisture. The West African crop is mainly shipped during the winter months in the Northern Hemisphere. It may be loaded at a temperature of about 30 °C (86 °F). After a few days into the voyage, the temperature both of the air and the sea will start to fall and, within a few more days, on reaching the North Atlantic it may be down close to freezing point. These are the conditions under which moisture will condense onto the cold metal of the ship and drip onto the cocoa. Hence good ventilation is essential, along with the use of absorbent lining materials to prevent condensation from damaging the beans.

Although the cocoa beans are dry, a hold containing 1000 t of cocoa at 7% moisture amounts to 70 000 l (15 000 gal) of water. If the moisture content of the cocoa reduces by only one-quarter percent to 6.75%, this releases 2500 l (560 gal) as water vapour which is available for condensation. This quantity of water, in the absence of good ventilation, is more than sufficient to cause wet patches on the cocoa beans, leading to mould growth.

As well as taking precautions during shipment, it is important to unload the cocoa promptly on arrival. Bags with damp patches can be segregated and dried prior to a decision being made as to their fate. In the case of bulk cocoa, on discharge any damp beans near the edges will be thoroughly mixed back into the bulk during the handling, and the moisture will re-equilibrate quite quickly within the lot, usually before there is time for mould to develop.

2.4.5 Storage of cocoa

Once they have been dried, cocoa beans are quite stable and will not deteriorate for several years, provided they are kept under good conditions. In order to prevent the growth of mould during storage, moisture in cocoa beans must not exceed 8%. High moisture levels can result from inadequate drying, moisture pick-up in humid atmospheres and leaking or damp stores.

Bagged cocoa should be stored off the floor (e.g. on wooden pallets) and away from the walls in dry ventilated warehouses. Individual lots of cocoa should be clearly segregated and labelled. Cocoa beans are susceptible to tainting by uptake of certain odorous substances from some other commodities (e.g. spices) and chemicals (e.g. fuels, paints, agrochemicals and cleaning substances). Therefore, they should not be stored in the same warehouse as these materials. Warehouses should also be free from vermin and infestation (see Section 2.4.6).

In the tropics, when it is very humid (e.g. at night or during rainstorms), ventilation can be temporarily stopped and then restored when the humidity drops again (e.g. during the day or in drier weather). Storing cocoa under polythene sheets is not recommended other than for very short periods of time.

The jute sacks allow water vapour to pass through, so that the cocoa beans gradually come into equilibrium with the humidity in which they are stored. The graph in Figure 2.15 shows the equilibrium moisture content for cocoa beans stored at different levels of relative humidity. To maintain beans below 8% moisture, the relative humidity must be less than about 75% for fermented cocoa beans. Less well fermented beans, such as those from the Dominican Republic and Sulawesi, are more hygroscopic and would need to be stored at a relative humidity below about 65% to maintain moisture of 8% or less. Partially fermented beans are more likely to stick together or form clumps and develop mould during storage and transport.

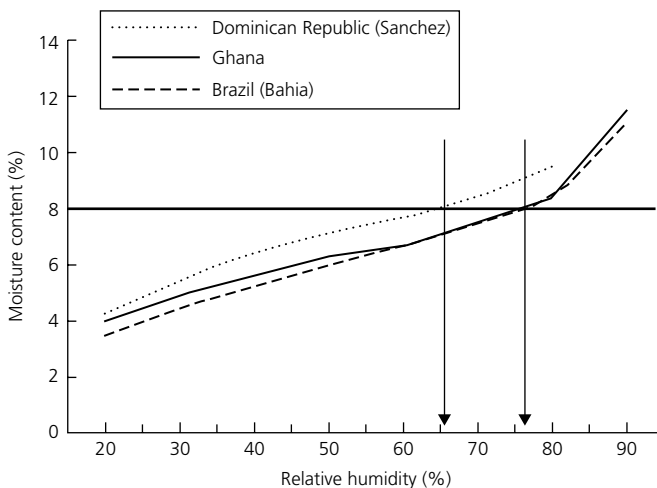


Figure 2.15 Equilibrium moisture content of cocoa beans (after Oyeniran, 1979).