SIMPLE WAYS TO IMPROVE COCOA PROCESSING

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INTRODUCTION

If the people who inspect or buy your cocoa have made no complaints, you may not need to read this. However, if complaints have been made, or if you do not have a lot of experience in cocoa processing, then this is for you.

Cocoa processing consists of the fermentation and drying of cocoa beans. These two processes must be done correctly to obtain dry cocoa beans that have a good chocolate flavour. Four simple steps are described that will result in finished cocoa beans that are less acid, better flavoured and acceptable to chocolate manufacturers.

FERMENTATION

Cocoa beans are fermented in special wooden fermenting boxes. During fermentation the beans mass becomes warm due to the action of yeasts feeding on the sugary pulp surrounding the beans. If the bean mass is properly aerated (air allowed to circulate in the mass), a temperature of greater than 50°C will be reached. A temperature of at least 50°C is needed to make the cocoa beans produce a 'chocolate' flavour.

Proper aeration is possibly the most important factor in obtaining good fermentation.

Air is needed in the ferment in the various chemical changes that take place. If there is not enough air in the beans there will be a slow, uneven build-up in temperature, a lower temperature maximum and a high proportion of under-fermented or 'cheesy' beans.

Good aeration can be achieved as follows:

1. Clean airholes

The bottom of the fermenting box must have clean airholes. Air enters the fermenting beans from below: blocked airholes are the most common cause of poor fermentation.

Airholes that are blocked with dried mucilage (liquid from the beans) or small beans also prevent the initial drainage of mucilage from the beans. This stops air from reaching the centre of the bean mass. Improved drainage of mucilage will also reduce drying costs as less water has to be removed during the drying phase.

Airholes should be thoroughly cleaned before filling the fermenting boxes with fresh wet cocoa beans and then cleaned each time the cocoa is turned.

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This is the easiest and cheapest method to encourage good fermentation. Even so we have noted that many fermentaries still do not follow this simple practice.

Airholes in the base of the fermenting box can be either slots or holes. Slots are the easiest and quickest to clean and are therefore better. It is quite simple to alter existing fermenting boxes to provide slots instead of holes. The slots, which are formed between the planks in the box, run the full width of the box and should be 3-5 mm wide. This allows them to be quickly cleaned, with a bushknife inserted into and run along the slot.

If holes are preferred, they should be 10 mm in diameter and drilled on a 10 cm square pattern all over the floor of the box. Holes must be cleaned out with a stick or wire: this takes more time and effort than cleaning slots.

Airholes in the side of the box are not necessary. They may cause a significant heat loss from the ferment, especially in cool and windy weather and in fermentaries that do not have walls.

You do not need to try to aerate the top of the mass. The usual thick layer of banana leaves and dry copra sacking provides necessary insulation and also acts as a moisture trap. This trap helps to keep out the organisms that will give cocoa a foul smell.

2. Daily turning

Daily turning helps good aeration and also breaks up lumps of fermenting cocoa into which air cannot penetrate. It also mixes the cocoa mass,

Daily turning is important for good aeration and therefore a good ferment

gives a more even ferment and stops the growth of mould in the colder corners and bottom of the box.

3. A 50 cm depth for ferment

Fermenting-boxes in Papua New Guinea usually allow for a deep ferment of 80-90 cm and more. The weight of a deep ferment compresses the bean mass and mucilage. This prevents air entering the centre of the mass, particularly if blocked airholes prevent the mucilage from draining away. The result with many deep ferments is a slow rise in temperature, cold spots in the bean mass and the peak temperature only being reached towards the end of the ferment.

Shallower ferments provide a relatively greater surface area for the same mass and thus more air. Fermenting boxes should be filled to a depth of 50 cm,

with a range of 45-65 cm. Do not use very shallow ferments as over-aeration may occur. This may cause over-fermentation and the development of foul smells.

All three fermentation suggestions are simple, practical management methods that can easily be used by any fermentary. The result will be a quicker, more even development of temperature and a higher temperature for a longer period. Research has shown that better aeration also helps in producing less acid cocoa.

Naturally, all the other requirements for good fermentation should still be observed, especially:

(a) Use only ripe, disease-free and undamaged beans.

(b) Fill the fermenting-box in one day and not over 2-3 days.

(c) Watch the end point of the ferment carefully to avoid the development of foul and foreign smells.

DRYING

The fermenting and drying processes go together and both must be done well to obtain good cocoa. Good drying cannot correct the errors of poor fermenting. At the same time well-fermented beans can be ruined by incorrect drying.

By the end of the fermenting phase, cocoa beans will have developed a brown surface beneath the skin. The deep purple colour typical of Papua New Guinea beans will have become paler. Development of the deeper brown and brown - purple colours preferred in dry beans comes during the drying phase and not in the fermenting boxes.

The most common faults observed in cocoa drying are:

(1) continuous drying

(2) dryers run at too high a temperature for too long.

Both practices can result in an incomplete development of colour and flavour. The beans remain 'locked' at the stage at which they left the fermentary.

Cocoa beans spread out on the dryer

A large proportion will be flat or shrivelled and will give a cheesy texture and purple colour in the cut test. Very high drying temperatures will also scorch and blacken the skin surface.

There are many ways of drying cocoa beans but one recommendation applies to all:

Resting

All cocoa should be rested for 12-24 hours after initial skin-drying. This allows for a process called diffusion or normalisation of moisture to take place within the bean. The final result will be a plumper bean with a more open texture, better colour development and a less acid taste.

A resting period usually occurs anyway in the case of sun-drying. Operators using hot-air and forced hot-air dryers need to devise their own method of allowing at least one period of rest for the batch. One system is to skin-dry the beans on the forced-air system and then transfer them for rest and final drying to a sun-dryer or kilnpipe hot-air dryer.

SUMMARY

(1) Clean the airholes at the bottom of the fermenting box before filling and thence after each turn.

(2) Turn the cocoa beans daily.

(3) Ferment cocoa beans at 50 cm depth in the boxes.

(4) When drying, allow at least one rest of 12-24 hours after initial skin-drying.

If you have any more questions about cocoa processing, you should contact:

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