THE IMPORTANCE OF TEA FACTORY ORGANISATION

By

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The *Tea Quarterly*, Vol. IX (1936), p. 199 contains an article on "Tea Factory Organisation and Management" by the writer, which was probably the first attempt in Ceylon to focus attention on the importance of methodical control in tea manufacture. This was followed up shortly afterwards by a paper on "Factory Organisation" delivered to the Tea Research Institute Conference in 1937 by F. J. Whitehead who did so much to systematise and control tea manufacture by reversible withering and by devising a system for organising rolling programmes. (Published in *Tea Quarterly*, Vol. X (1937), p.70.)

The outbreak of war in 1939 was followed by a period of ten years when tea was purchased under contract to the United Kingdom Government. It was inevitable that such a system should be introduced and that the lack of competition should remove the stimulation which kept teamakers interested in their jobs and estate managers actively concerned about the quality of leaf and standard of manufacture. When invoices sold on merit such a stimulus was a very real factor in maintaining high standards for our teas.

The Tea Research Institute realising the dangers inherent in a decline in standards of teas exported vigorously stressed the need for care in the control of plucking and organisation of manufacture. "A Review of Tea Manufacture in 1941" (*Tea Quarterly*, Vol. XIV (1941), p. 65) urged that more care should be taken in factory organisation and hygiene. At the Conference held in Kandy in 1949 the whole staff, aided by the late Mr. Robert Horne, delivered papers on various aspects of a common theme, namely the improvement of standards of plucking not only in the interests of the quality of teas exported, but also in maintaining the health and yield of the tea bush itself.

More recently, E. L. Keegel has published two important papers entitled "Common Problems in Tea Manufacture" (*Tea Quarterly*, Vol. XXII (1951), p. 20) reprints of which are still available, and "Relation of Coarse Plucking to Quality of Made Tea" (*Tea Quarterly*, Vol. XXII (1951) p. 112), both of which are fully up-to-date and worth close attention.

Fortunately, the standards of teas produced in Ceylon have not declined to the same extent as in other producing countries and we now have cause to be thankful for the efforts which have been made to maintain our reputation for quality.

With the re-opening of the Colombo Auctions in 1947, and subsequently the London Auctions in 1951, competition was re-introduced, but since a sellers' market remained, most types of tea found buyers willing to pay high prices until production commenced to overtake consumption in 1951. Now we have a buyers' market, and more tea being made in the world than is being drunk. Although we still see well made good quality teas selling at remunerative prices buyers are in a position to discount poorly made teas to a level below the cost of production. For those estates selling under cost of production there seems to be but two alternatives—

(1) To improve the quality of their output *or*

(2) To close down

Legislation relative to the employment of Estate labour has been introduced to stabilise the basic pay at an agreed minimum level, and since up to 60% of the cost of producing tea is on labour charges, any appreciable reduction in plantation production costs is not possible. The closure of estates means unemployment which

no one wishes to encourage. On the other hand, by improving manufacture, present full employment may be maintained and remunerative prices obtained for Principals.

I will now follow the outline of my article in 1936 and endeavour to formulate certain broad principles which must be adopted in tea manufacture if the best results are to be obtained. To make good tea it is essential to have leaf plucked regularly from well cultivated bushes ; the shorter the plucking rounds the better the leaf which may be taken, but in maintaining short rounds stripping must be avoided. The old planters' motto was " Leave one full leaf above the fish ", and there is nothing wrong with that dictum today. Assuming that all Agency controlled estates still follow this principle, it must be strongly commended especially to those who are outside such control. Suitable propaganda is necessary for smallholders, and every endeavour should be made to educate them up to a higher level of understanding on tea production, than is the case today. It must be remembered tea is Ceylon's largest national asset and any estate owner, however large or small, who neglects the fundamental requirements for making the best use of his property is not working in the fullest possible interest of the country.

Now to refer to specific control of tea factories. I wish to make it quite clear that the following suggestions do not necessarily indicate the best way to make tea—every estate has its particular requirements and peculiarities, of which those responsible are the best to judge—but it follows that by having some system of control, consistent results will be obtained.

In 1936 I wrote :—

" Following the leaf from the pluckers' hands we will assume that plucking is arranged so as to give an even flow of leaf to the factory, and that the leaf arrives at specified times by whatever method of transport is used.

It is most important that those responsible in the field should have definite written instructions as to when their leaf should be deliverd at the factory, and that these instructions be strictly carried out. The factory staff then knows when to expect leaf—with different seasons of the year times of weighing will probably vary, arrangements for which can easily be made.

The teamaker should know what amount of leaf he is to receive daily and the best time for estimation of leaf intake for the day is usually found to be at the morning muster, after the number of pluckers for work at each field has been ascertained. A note can then be made on the muster chit and the information transmitted to the factory."

This still applies.

The problem of smallholdings is complex but I feel that owners have plenty of scope to help themselves if they treat their tea well and pluck good leaf. Having done this, they may readily sell their leaf at good prices to factory owners who will thus have their profit assured. Exploitation about which smallholders complain today will be reduced by their own action. Smallholdings' advisory officers of the T.R.I. have been specially appointed to help this type of producer who can find a ready market for his leaf provided it is of good quality.

A Manager of a tea estate having taken steps to assure himself that suitable leaf will be delivered at his factory, will next be concerned over the method of manufacture to follow. No hard and fast rule can be laid down for all factories, as conditions differ so much, but however they may differ, the functioning of machines remains the same and daily intake to the factory has to be suitably fitted into thier capacity. In designing a programme one must first of all know the output of the driers at defined mechanical speeds, and from this knowledge one can calculate the amount of withered leaf to be fed to rollers over fixed intervals. Tea factories are usually equipped with machinery matched to the annual output of the estate, and for the purpose of illustration, let us take a factory having only one drier with an output of 200 lbs. made tea per hour.

Bearing in mind the broad principle that tea manufacture is based on a series of processes whereby the initial moisture content of green leaf is reduced from some 76% to 3% in the made tea, let us assume figures based on drier inlet temperatures of 180–200 degrees and a minimum of 120 degrees exhaust, and the fermented leaf having a moisture content of, say, 50 to 53 per cent. The difference in moisture of green leaf to fermented leaf (76% to 50%) has been effected in withering. Any variation in moisture content will affect the out-turn of the driers, hence the necessity (apart from other considerations) of being able to control a wither over a given period within the required limits. For this illustration we will assume that we are stripping from the tats leaf having a moisture content of 52 to 53 per cent.

If our made tea is to contain 3 per cent moisture we shall be driving off 49 per cent to 50 per cent moisture in the drying process, and in the rolling process a loss in weight of from 2 per cent to 3 per cent is usually registered.

Hence, for all practical purposes, to calculate the amount of withered leaf the driers are capable of dealing with, one must double the drier out-turn figures.

If one is withering harder or lighter than these figures allowance can be made either way.

Dealing with 200 lbs. made tea per hour and assuming that we commence the rolling programme with two rollers into each of which 250 lbs. withered leaf can be suitably charged, the charging interval is then easily calculated by converting the rate of firing into the rate of dealing with withered leaf.

200 lb. made tea per hour	=	400 lb. withered leaf per hour (or equivalent if wither is harder or softer)
400 lb. withered leaf per hour	=	$\frac{400}{60}$ lb. withered leaf per minute

A charge of 500 lb. of withered leaf will, therefore, feed the drier for

$$500 \times \frac{60}{400} = 75 \text{ minutes.}$$

The roller charging interval is therefore 75 minutes. By calculating the drier capacity in terms of withered leaf, the drier can be kept working without gaps in feeding over the day's work, and in the same way a complete table can be calculated for any factory equipped with one or a combination of driers showing how it is possible to keep them working uninterruptedly after work has commenced.

Provided a teamaker understands the set plan to be followed, he can take appropriate steps to see that withers are sufficiently controlled to provide leaf for feeding to the rollers to meet the predetermined programme. In many cases complications in adapting the capacity of rollers and roll breakers to drier output must arise, but a little ingenuity usually overcomes the problem. In practice it will be found necessary to lay down certain requirements for which the Head Teamaker will be responsible, in which connection I would like to stress the importance of the teamaker's work, which today is duly recognised by the majority of employers who remunerate in accordance with generous agreed scales, besides paying commission in many cases. For the future it is hoped this work will attract educated young men of a good social standing as it is interesting, well remunerated, work that should not be looked down upon by young men of good education. The Head Teamaker is of course responsible for carrying out the programme as set out by the Management, and he in turn delegates duties to junior members of the factory staff, such as the factory assistants, K.Ps, etc. To ensure that no misunderstandings take place and in order to maintain a high standard throughout daily working, it has been found advisable that written instructions should be given to those in charge of various departments in the factory.

The various units of machinery to which I have referred must always be maintained as specified by the makers. In particular the checking of speeds must be done at least once a week ; with such high variation in climatic conditions as we have in this country machinery driven by belting can vary in speed from day to day, and this must not be allowed to take place. The Superintendent will naturally want to be able to see quickly and easily what is happening when he pays calls of inspection at the factory. For some years now it has become common practice to have fixed, in conspicuous positions, various blackboards on which the teamaker sets out figures of green leaf estimates, leaf received, labour employed at the factory, as well as other details which may be required.

FIGURE I

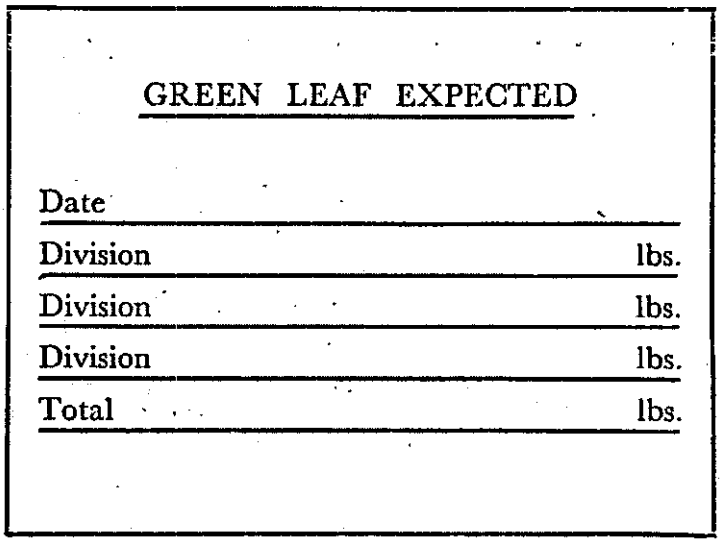
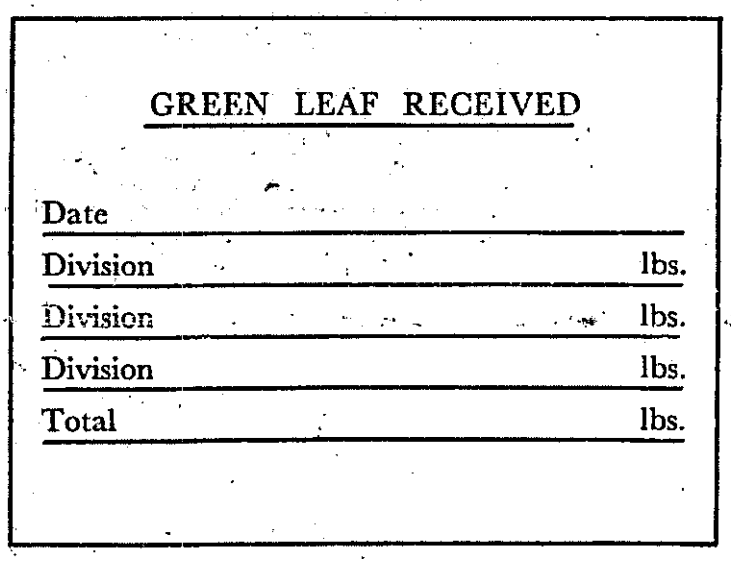


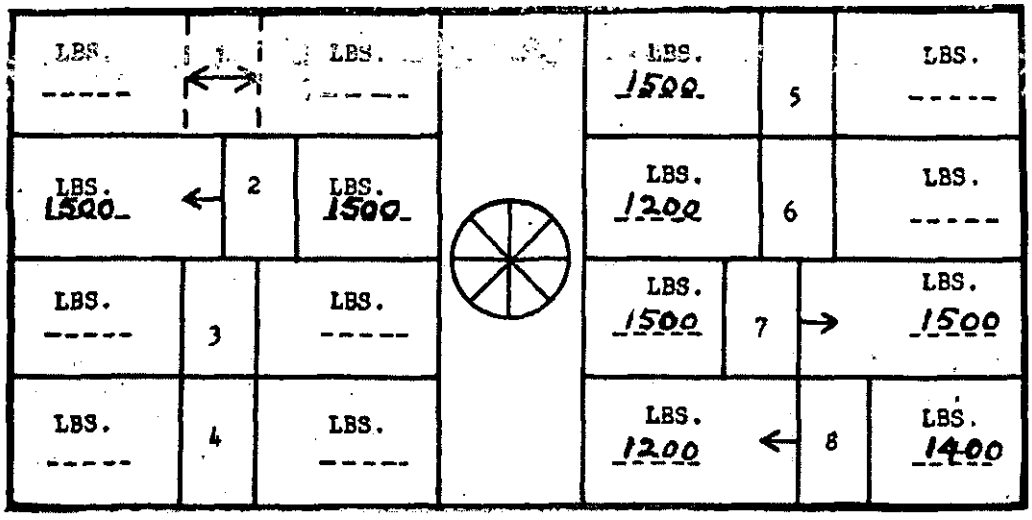
FIGURE II



Control of withering is usual rather than the exception now, various methods being used for which one of the factory assistants or K.P.s. is responsible. In order that control may be suitably elastic it is necessary to keep records showing the period and temperature of conditioned air used over various lofts with the degree of humidity. Apart from these figures it is useful to have an indicator which shows the Superintendent how withering is being carried out immediately he enters the factory, which saves much time and questioning.

FIG. III

WITHERING INDICATOR



1. Indicator is in the form of a Black Board on which lines and figures are set out in white paint.
2. Weights of green leaf may be chalked as spread daily.
3. Superimposed panels (as in loft No. 1 indicated by dotted lines) are fitted so as to slide to left or right to expose appropriate arrow indicating direction of air flow.
4. Loft 7 and 8 are shown in use with reversible air flow and loft 2 direct flow.

Records for withering, rolling and other processes are kept in a number of different ways, the actual detail being immaterial, provided the answers given are those required in checking and that forms are filled up with figures of *actual* results and not results which are *desired* by the Management.

The conscientious Superintendent will not only work out for his factory (probably in consultation with the V.A. and Engineers) the type of programme outlined, but will take the trouble to check weights and figures himself while manufacture is going on—preferably at times least expected by the factory staff.

FIGURE IV

WITHERING

Month:—

Date	Time received	No of Weighing	Factory Weight of Leaf	Condition and Type of Leaf	Spread in Lofts	TIME FANS WORKED			Time knocked down	Weight of withered Leaf	Period of wither	Weight of made tea	% Out-turn on withered Leaf	HYG. AT BULK. CHAMBER			
						On	Off	Period						Removal of Surface Moisture		Withering	
														Dry	Wet	Dry	Wet

FIGURE V

ROLLING

Weight of Green Leaf for day

Date:—

Time of Charging	Weight of withered leaf	ROLLERS											Mist Chamber	Weight of fermented leaf.	Loss in rolling.	Period of Fermentation.	Made tea weighed up.	Addapu dhool	HYGROMETRIC READINGS					
																			Rolling room		Fermenting room		Outside	
		1	2	3	4	5	6	7	8	9	10	11							Dry	Wet	Dry	Wet	Dry	Wet
Total																								
Percentage																								

I do not propose to refer in detail to the final processes of grading and packing—sifting is a mechanical process following on tea firing in order that the bulk of fine and coarse leaf may be suitably graded to meet the requirements of the buyers. However I would like to emphasise that best results will be obtained by doing a maximum of sorting in the rolling room by roll breakers, instead of sifting fired tea causing " greying ".

Finally the sooner tea is packed after cooling off and sifting the less likelihood there is of moisture being absorbed and quality lost.

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