

that such investigations constitute the principal means of studying first principles relating to the optimum conditions of work for the operatives of the future. It should be remembered that the average workman spends about one-quarter of his life in the factory, and his environment there is almost as important as any other condition of his living.

There can be but little doubt that the Industrial Fatigue Research Board is carrying out work of vital importance to the trade of this country. As the work proceeds, new fields of investigation are continually opening out which lie beyond the scope and the present resources of the Board. The suggestion is made that industries should extend their co-operation with the Board by agreeing, themselves, to assume partial responsibility for the supervision and the financial support of the industrial side of their work. The Board are willing to formulate any detailed schemes dealing with the method and extent of co-operation. This suggestion might well be considered by the Research Fund Committee of our Institute, for the conditions of labour in the hop gardens, maltings, and brew-house are very diverse, and present problems which would amply repay systematic investigation.

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THE JUDGING OF CIDER.

By W. R. BURTON.

IN buying cider for bottling it is usual for brewers and bottlers to rely almost entirely on a palate test which is seldom capable of detecting a cleverly faked sample. The only fair way of judging ciders is, in addition to the palate, to determine the original gravity, acidity fixed and volatile, and the presence or absence of mineral acids.

Unfortunately the law appears to be somewhat elastic as regards what may be offered under the label "cider," and our French neighbours are ahead of us in this respect, as only cider made from undiluted apple juice can be labelled cider (*pur jus*), the diluted articles being sold as "*boisson cidre*" and "*petit cidre*" according to the degree of dilution.

The finest ciders are undoubtedly made from pure undiluted apple juice, and the best vintage apples come from Devon, Hereford and Somerset. The average original gravity should be from 1048° to 1050°; the ciders made in the autumn of 1921 were exceptionally good, original gravities of 1053° being common.

Cider which is made from clean fruit with clean utensils and plant, and stored under proper conditions, will contain little or no acetic acid, certainly not above 0·075 per cent., and here it is where so many ciders are spoiled. The fruit is not washed; racks, cloths, vats, casks, etc., are kept in anything but a sterile condition, with the result that the *Bacillus aceti* multiplies to such an extent that the factory and surrounding district reeks of the smell of acetic acid, to say nothing of the cider itself.

Ciders are being offered for sale to-day containing as much as 0·3 to 0·4 per cent. of acetic acid, and, needless to say, such ciders can neither be good for the bottler or the digestive system of the drinker. Original gravities vary from 1052° to 1017°, the latter would, of course, represent approximately a dilution of two parts of water to one of apple juice.

The better class cider makers are endeavouring to improve cider, which, when properly made from pure apple juice, is a beverage fit for anyone, but much harm is done to the industry by the poor class of ciders offered for sale by unscrupulous firms, and brewers and bottlers can help the cider industry, and at the same time their own interests, by refusing to purchase ciders which have an original gravity of less than 1048° or so, and a higher percentage of acetic acid than 0·075 per cent.

In the following table are the analyses of ciders purchased in various parts of the country during the present year, from which it will be obvious that the foregoing remarks are fully justified.

	A.	B.	C.	D.	E.	F.	G.
Original gravity	1052°	1049°	1047°	1045°	1048°	1034°	1017°
Acidity, total, per cent. ...	0·55	0·517	0·639	0·493	0·69	0·72	0·69
Volatile acidity, per cent.	0·040	0·180	0·204	0·114	0·252	0·218	0·36

It will be seen that the only cider made from pure apple juice, and reasonably free from acetic acid, is A. B, C, D and E all contain too high a proportion of acetic acid, and are diluted to some small extent, while F and G speak for themselves.

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