

More generally

$$LM \text{ (per cent.)} = \frac{100N_T - F_{Ext.} N_M \left(\frac{100}{F_F} - 1 \right) - K_F C}{N_M \left(1 - \frac{F_L}{F_F} \right)} \quad (1)$$

where K_F = The percentage of nitrogen in the filler used, and calculated on the dry carbohydrate. For wheat rusk², $K_F = 2.0$ and for pearl barley³, $K_F = 1.8$. For starch fillers such as cornflour and potato starch, however, $K_F = 0$.

By means of this more general formula it is possible to incorporate appropriate values not only (as previously) for F_L , F_F and N_M but also for K_F .

Assuming the allowable limit of fat in "lean" meat is 10 per cent., and 90 per cent. of fat is the average fat content for outside (visible) fat in meats such as pork and beef, the following represents a slightly simplified formula compared with that previously published⁴.

$$LM \text{ (per cent.)} = \frac{112.5 \left(N_T - BF_{Ext.} - \frac{K_F C}{100} \right)}{N_M} \quad (2)$$

where $B = 0.1 \left(\frac{N_M}{90} \right)$ and using this for pork and beef the following factors would normally be used:

	N_M	B
Pork	3.45	0.003833
Beef	3.55	0.003944

For most fresh sausages $K_F = 2.0$.

If dried skimmed milk is present in the meat product formula (1) becomes

$$LM \text{ (per cent.)} = \frac{100N_T - F_{Ext.} N_M \left(\frac{100}{F_F} - 1 \right) - K_F(C - 0.5S) - 5.8S}{N_M \left(1 - \frac{F_L}{F_F} \right)}$$

where S = the percentage of dried skimmed milk in the product⁵.

C = the percentage of total carbohydrate (by difference), including lactose, in the product.

Further allowing for the suggested proportions of 10 per cent. and 90 per cent. fat in the lean and fat respectively, formula (2) becomes

$$LM \text{ (per cent.)} = \frac{112.5 [N_T - BF_{Ext.} - 0.058S - 0.01K_F(C - 0.5S)]}{N_M}$$

The above equations, as with the modified Stubbs and More formulae⁵, assume that the only sources of protein are meat, cereal filler and dried milk. Obviously they would not apply if other protein containing materials such as soya flour, sodium caseinate or purified proteins were present⁶.

References

1. Pearson, D., *J. Assoc. Publ. Analysts*, 1970, **8**, 22.
2. Society for Analytical Chemistry, *Analyst*, 1965, **90**, 579.
3. Society for Analytical Chemistry, *Analyst*, 1968, **93**, 476.
4. Pearson, D., *J. Assoc. Publ. Analysts*, 1968, **6**, 129.
5. Pearson, D., "The Chemical Analysis of Foods", 6th Edition, Churchill, London, 1970, p. 385.
6. Hornsey, H. C., *Food Manufacture*, 1969, **44** (1), 48.

Mould Content of Certain Tomato Products

AN OFFICIAL VIEW OF THE ASSOCIATION OF PUBLIC ANALYSTS

In the absence of legislation and negotiated agreements with representative trade organisations, the Council of the Association of Public Analysts has decided to announce standards which members of the Association will adopt and apply to certain tomato products submitted for analysis. Action will be recommended against such products as fail to meet the requirements of the standards which are as follow:

MOULD CONTENT OF TOMATO PRODUCTS

1. **Tomato Purée.** The *Howard Mould Count* of this product shall not exceed 50 per cent. of positive fields.
2. **Tomato Juice.** The *Howard Mould Count* of this product shall not exceed 25 per cent. of positive fields.

For the purposes of this Official View, the *Howard Mould Count* shall be carried out in accordance with the procedure specified in the eleventh edition of the Official and Tentative Methods of the Association of Official Analytical Chemists (of America).*

* "Official Methods of Analysis of the Association of Official Analytical Chemists," 11th Edition, Washington, D.C. 20044, 1970, page 824.

**Frederick Cecil Bullock, B.Sc., M.Chem.A.,
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PRESIDENT 1956-1958

The sudden and quite unexpected death of Fred Bullock has deprived the Association of Public Analysts of one of its most distinguished members. There had been no apparent illness and only a day or so previously he had been enjoying the tranquillity of the Norfolk Broads when, at 3.0 a.m. on the 4th May at the age of 74, he died in his sleep at his home at West Runton.

Bullock was a native of Leicester and attended Melton Road School and the Wyggeston Boys' School for his general education. His scientific studies began at the Leicester College of Technology and were continued at the East London College where he obtained an external London B.Sc.(Hons.) degree in chemistry, under Professor Partington.

During the 1914-18 War, Bullock served his country's cause in the Royal Navy as a wireless operator, and on his discharge in 1919 obtained a post at Taylor, Taylor and Hobson Ltd., as a research assistant. In 1925 he was appointed Assistant to Mr. Burford, Public Analyst at Leicester, and eventually studied the chemistry and microscopy of food, drugs and water at Battersea Polytechnic. He obtained his Branch E Certificate on the 18th May, 1928, and was elected to the Fellowship of the Institute of Chemistry on the same date. He succeeded Mr. Burford as the Leicester City Analyst on the 1st July, 1929. Bullock subsequently served the whole of his professional career in the Leicester laboratory.

Bullock's predecessor, Burford, was greatly interested in water, and this undoubtedly stimulated him to develop a similar interest which, apart from his interest in legalities, seemed largely to override the other facets of his profession. His enthusiasm for water was highlighted in his work for the River Manifold and River Dove water schemes for Leicester, and he was able to contribute to the construction of the Water Works and Reservoir—a scheme in which he had the satisfaction of seeing some of his son's work (as a Civil Engineer) incorporated.

Right from the start of his career, Bullock played his part in supporting scientific societies. As early as 1933 he was President of the Leicester Literary and Philosophical Society, and delivered a presidential lecture upon Atmospheric Pollution, a subject which even in 1971 is not without interest. As a Fellow of the Institute of Chemistry he worked enthusiastically to found the East Midlands Section, and subsequently served in the capacities of Chairman and District Member of Council. He was also a founder-member of the Society for Water Treatment, being elected President during 1961-62. It is hardly necessary to say that he was also a founder-member of the Association of Public Analysts, and his term of office as President during 1956-58 culminated with a retiring presidential address entitled "Human Relationships". He designed the Badge of the Association which is appended to the Presidential chain of Office. Not content with such professional activities, he was also an enthusiastic Rotarian (presiding over the Leicester branch in 1954-55) and a Mason, attaining the rank of Master of his Lodge.

During the Second World War, Bullock acted as Gas Identification Officer and surrounded himself with a loyal band of local scientists who eventually formed the core of the Civil Defence Scientific Intelligence Officers' Section, under his leadership. Undoubtedly his flair for dry humour did much to alleviate the feeling of doom during this wartime period, a characteristic which also made him much in demand as an after-dinner speaker throughout his career.

Outside the laboratory, Bullock was great company, his wit and humorous stories making things go with a swing. However, across the threshold into the laboratory his

character seemed to change. Here he was a strict laboratory disciplinarian who liked to see all benches cleared and clean every night, though during the latter eleven years of his term of office, he did not carry out any laboratory work himself. Perhaps because of this he was suspicious of instrumentation, and upon being asked to authorise an order for a U.V. spectrophotometer, passed the remark that "You young chaps can't work without complicated toys, we could do all our work with a Bunsen burner and a burette!" Perhaps this remark was said with "tongue in cheek", but he did not like the introduction of so many modern gadgets in the home, the car, or the laboratory for quite logically he held the view that the more gadgets one possessed, the more there was to go wrong.

In the professional sphere, Bullock had much to offer especially from the legal aspect. Food labelling was one of his great interests, which led him to be included in the Food Standards Committee Working Party on Food Labelling, whose report was published in 1964. He also represented the Association of Public Analysts in Norway, when the Code of Practice regarding Norwegian Crab Products was negotiated.

Bullock took great pains over the written word and his reports and letters were reframed and redrafted until they were word perfect. His Annual Reports were eagerly awaited by the local press, who regularly published those gems of expression of which only he could be capable. In a recent letter to me he stated, "I was well below par in health, and trusting to the temporary assistance of antibiotics, alkaloids and the artificial aid of other additives (I can never avoid or resist a little alliteration) to keep going at all".

After his retirement in February, 1962, Bullock left Leicester to live at West Runton, Norfolk, where he was able to play golf, at which he admitted he was not a professional but gained great pleasure from the game. Above all he was a keen observer of nature, and his proximity to the marshes and Broads of Norfolk must have given him great pleasure during his retirement. He loved to travel away from the madding crowds and spent many holidays in Norway and Ireland where he could observe the wild life.

Frederick Bullock is survived by his wife and son to whom he was a devoted husband and father, he was also particularly proud of his two grandchildren. The Association mourn with Mrs. Bullock, her son and grandchildren, an eminent Past President and respected colleague whose services are still greatly appreciated.

E. R. PIKE