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AQIS
INSTRUMENT OF APPROVAL

For

Distell’s Torry Meat Fatmeter

for the

Estimation of the Fat Content
of
Mince Meat Samples
COMMON WEALTH OF AUSTRALIA
EXPORT CONTROL, ACT 1982
EXPORT MEAT ORDERS

INSTRUMENT OF APPROVAL.

I, MARK ANDREW SCHIPP, delegate of the Secretary, pursuant to subclause 1.3 in PART 2 to Schedule 2 of the Export Meat Orders, hereby approve use of the Distell Fatmeter (also referred to as the Distell Torry Fatmeter) specified in Schedule 1 to this Instrument for the purpose only of determining chemical lean content of meat, edible offal and meat products, subject to the conditions specified in Schedule 2 to this instrument.

SCHEDULE 1

Use of the Distell Fatmeter (also referred to as the Distell Tony Fatmeter) identified as model 1092-CDF conforming with the detail specified in the document entitled…

“DISTELL INDUSTRIES LTD - TECHNICAL MANUAL - DISTELL FATMETER 1092-CDF - CE”.

including the procedures relating to its use, that is provided as part of an undated application addressed to Mr P Corrigan - Manager, Technical Services Branch, Australian Quarantine and Inspection Service, Department of Primary Industries and Energy (directed to the attention of Dr Kiran Johar) from Mr Jeff Rogers, Group Marketing Manager, Linbrook International Pty Ltd (ACN 001 708 309), 8 Lymoore Avenue, Thornleigh, New South Wales.

SCHEDULE 2

Use of the Distell Fatmeter (also referred to as the Distell Torry Fatmeter) to determine chemical lean for any official or prescribed purpose is restricted in all cases to -

(a) analyses comprising samples of comminuted meat, edible offal or meat product; and
(b) analyses where each analytical test comprises a minimum of 3 replicate (sub)samples.

DATED THIS Twenty Second DAY OF January 1998

MARK ANDREW SCHIPP
Acting Veterinary Officer Class 4
Australian Quarantine and Inspection Service
Department of Primary Industries and Energy
Position Number 13941

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Background

The ability to rapidly, accurately and reliably determine the fat content of mince meat is of considerable use to boning room operators, further processors and the retail trade. There are many methods for the determination of the fat content of meat samples but the use of most of them by industry is minimal because of cost, the time required to complete the tests, or the labour intensity.

There have been requests to establish the efficiency, suitability and accuracy of the Torry Meat Fatmeter and recommend whether it should be included in the list of approved methods for chemical lean analysis in Schedule 2 of the Export Meat Orders. This report provides the results of an evaluation of the instrument for analysing samples of mincemeat purchased from retail outlets.

The Torry Meat Fatmeter which is made and distributed by Distell Industries Ltd, West Lothian, Scotland, is based on extensive developmental work that was undertaken at Torry Research Station, Aberdeen. This analyser is a portable, hand-held unit which utilises a microstrip microwave sensor to estimate the water content of the sample. The unit responds to the dielectric permittivity of the meat sample which has a linear dependence on water content (Ohlsson et al, 1974). The relationship between the moisture and fat content of meat is well known (Eustace and Jones, 1984, Thornton et al 1980) and was used by Distell to establish the internal calibration of the unit to enable it to estimate the fat content of the sample.
Methodology

The instrument was provided to us with an internal calibration which was pre-set by the manufacturer. A check-pad was also provided for daily checks of the calibration. On each occasion the Fatmeter was used, eight readings were taken of the pad, with the meter averaging the reading to give a value which had to be within $\pm 2\%$ of the reference value. The unit has four fat ranges which it is capable of measuring; Pork mince, Lamb mince, Homogenised Beef and Beef mince. For the evaluation the unit was set to the correct fat range for the samples to be tested.

Five 3kg samples of prepared mince were purchased from a range of butcher shops and supermarkets. Mince was purchased on the day of testing either as a single retail bulk pack or as multiples of smaller packs that had the same time, date and product type. The mince was divided into six 500g subsamples. Each sample was placed into bags labelled with the mince type and an arbitrary number from 1 to 6. The samples were then refrigerated until testing commenced.

When required for testing, a sample was removed from the bag, rolled into a ball, flattened into a patty and placed into a flat Pyrex bowl for measurement according to the procedure specified by Distell. Four readings were taken on each side of the patty. For each reading the head of the meter was pressed firmly onto the sample so that the sensor was in direct contact with it. The meter automatically averaged the eight readings and the resultant value was recorded. The sample was again mixed, reformed into a patty, and re-tested until it had been tested a total of three times.

After testing by the meter was completed, the patty was coned and quartered, to give a 250g subsample which was blended in a food processor (Sunbeam Oskar II) to the required paste-like consistency. It was kept frozen until required for testing by soxhlet analysis to determine the fat content.
Results and Discussion

In all, 30 samples were tested, each in triplicate, by each of the instrumental and solvent extraction methods. Averages of the triplicate values were used to produce the relationship in Figure 1 between the fat readings determined by solvent extraction and those from the meter. The figure clearly shows the linear relationship.

![Figure 1: Relationship between the mean Fatmeter readings and the mean results from Soxhlet extraction.](image)

The determinations by the two methods were highly correlated. Variation in the Fatmeter results accounted for 95.9% of the variation in the results determined by the reference method. Eustace and Jones (1984) reported that variation in water content data for beef (determined by the reference method of overnight drying at 102 °C) accounted for 97.8% of the variation in the fat content results determined by the reference solvent extraction method. With the current calibration the meter slightly overestimated the fat content. For mincemeat samples with actual fat contents in the range 8 to 15 %, the average meter values which were approximately half a unit higher than the values from solvent extraction.

For instance, for a sample which contained slightly less than 10 per cent fat according to the reference method, the meter gave an average value of 10.7%.
Results and Discussion continued…

The results obtained with the Torry Meat Fatmeter confirm the validity of using this method for the prediction of the water content or fat content of minced beef. The high correlation between the dielectric permittivity and water contents supports the work carried out by Kent et al.

Measures of the inherent variation of the test methods were determined. The residual standard deviation of triplicate determinations were 0.51, 0.52 for the Fatmeter and reference methods respectively. Based on this performance, triplicates of eight readings with the Fatmeter would give reliable estimations of fat content in commercial situations. Single sets of eight readings would not give sufficiently reliable estimations to comply with the AQIS requirements for export-regulated boning rooms. It is therefore recommended that the procedure used for this evaluation be followed, namely, each patty should be tested three times, with the results averaged.

The Torry Meat Fatmeter unit was found to be a quick, easy and non destructive method of analysing mince products, with results being available within two minutes. From the work carried out and reported above, the meter would be suitable test meat collected and minced from core samples from cartons of manufacturing meat.

Conclusion

The evaluation of the Torry Meat Fatmeter indicates that the instrument is capable of providing good estimates of the lean meat content of the product. It is capable of providing these estimates rapidly and easily once the sample has been minced.

It is recommended that the technique be added to the list of techniques in the Export Meat Orders which are approved for use to monitor the fat content of mince or minced products to be sold to a CL specification.
Summary

The Torry Meat Fatmeter was evaluated to determine its ability to accurately predict the fat content of beef mince. Thirty mince samples of various fat contents were analysed in triplicate, using the Torry Meat Fatmeter and soxhlet fat extraction. Results of the trial showed that there was a good linear relationship with a high correlation between the triplicate Torry Meat Fatmeter readings and soxhlet results. The residual standard deviations of triplicate readings were 0.51 and 0.52 for the Fatmeter and reference methods respectively. Based on this performance, triplicate sets of eight readings with the Fatmeter would give reliable estimations of fat content in commercial situations.

The Torry Meat Fatmeter is capable of providing the estimates rapidly and easily once the sample has been minced. It is recommended that AUS-MEAT and AQIS be approached to add the technique to the list of techniques in the Export Meat Orders which are approved for use to monitor the fat content of mince or minced products to be sold to a CL specification.
References


