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Dynamic Deformation as an Aid to Texture Measurement

1. Introduction.

Most devices which have been used to obtain an objective measure of the tenderness or texture of meat have depended on resistance to static forces (e.g. cutting, preserving). Because the impression received by the palate is derived from the simultaneous operation of a complex of contributory factors it was suggested that the response of meat samples to a dynamic deforming force might give a more accurate measure of the consumer's subjective reaction.

2. Procedure.

The apparatus used for dynamic deformation consists of high frequency electric oscillator which drives a vibrator. The vertical shaft of the vibrator carries (i) a flat plate, which impinges on a meat sample of standard size (removed by a cork borer) held against the closed end of a metal cylinder and (ii) a horizontal steel needle. When vibrations are applied to the meat, the amplitude of vibration of the needle (measured at its free end by a travelling microscope) is depressed to an extent which depends on the texture of the sample. It has been found that a frequency of 75 cycles/sec., a needle length of 15 cm. and a needle

thickness of 2 mm. best reveals differences between samples.

3. Results.

Data obtained with the deformer on raw meat from different portions of beef carcases have been compared with those obtained using the Grünewald tenderometer. Typical results are shown in the Table.

Location in carcase	Grünewald Shearing Force Kg/cm^2	Vibrational Amplitude mm	% Gelatin with equivalent response
Shin (foreleg)	0,19	2,1	86
Chuck (neck)	0,16	2,8	70
Round	0,13	3,8	56

It will be seen that the values obtained by the deformer indicate a somewhat greater responsiveness to textural differences than is shown by the Grünewald machine.

The deformer has been able to detect a decrease in the elasticity of meat with the onset of rigor mortis; and also subsequent softening which occurs during conditioning. Its versatility is further attested by its detection of decrease in tenderness in frozen meat with increasing time of storage over 2 weeks at - 15°C and of changes in tenderness during various cooking procedures.

4. Conclusions.

The responsiveness of the dynamic deformer can be increased further by combining it with a cathode ray oscilloscope (an aspect which is being investigated),

but even in its present form it provides useful information on meat texture - and at approximately one third of the price of more sophisticated instruments.