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Effect of the degree of comminution on sensory and texture attributes of low fat beefburgers

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## Introduction

The role of fat as one of the main causes of cardiovascular disease (Kritchevsky, 1994) and colon cancer (Lapre and van der Meer, 1992) been well documented. For these reasons there is an increased demand by consumers for lower fat foods. The main problems associated were reduced fat meat products are loss in sensory and textural quality in comparison to the higher fat counterparts (Berry, 1994; Troutt *et al.* 1992).

Extensive research has been carried out on fat replacers to improve quality in many products (Lucca and Tepper, 1994 and Singhal *et al.* 1991) Another aspect which has been shown to merit investigation is the modification of various preparation factors ((Dreeling *et al.* 1996; Ling) Keeton, 1994; Berry, 1993). The preparation of beefburgers involves various steps which may have an influence on sensory and textural quality Egbert *et al.* 1991 found that overall palatability could be improved slightly by final grinding through a 3/16 inch plate rather than a 1/8 prive

Meat comminution is a very practical means of processing lower value meats into products acceptable to consumers. The degree of comminute influences the structural and textural characteristics of many products and has been shown to be a major determinant of end-product quality and Keeton, 1994; Berry *et al.* 1987; Jeffery and Lewis, 1983; Cardello *et al.* 1983). However, there is little information available on the effect of comminution on the textural and sensory properties of low-fat beefburgers. Such a study therefore seems worthwhile.

### Objective

To assess the effect of the degree of comminution on sensory and texture attributes of low-fat beefburgers.

#### Methods

A batch of low fat beefburgers (8% fat, 8% water, 0.5% salt) was prepared using flank lean and fat. Three different degrees of comminution<sup>w</sup> achieved by mincing through plates with either 2, 5 or 10 mm orifice sizes. Burgers were blast frozen at -20°C prior to cooking. Burgers were grilled to an internal temperature of 72°C for ~12min and were turned every 2 minutes. Sensory analysis (hedonic scaling) of the cooked burger was repeated four times with a panel of eight judges. Measurements on an Instron using the Warner Bratzler blade, the Kramer shear method<sup>w</sup> Texture Profile Analysis were made on two burgers per batch. The experiment was repeated three times.

#### **Results and Discussion**

The analysis of variance results of the sensory assessment are summarised in Table 1. Degree of comminution had a significant effect of the characteristics except overall texture. There was a very consistent trend for all characteristics whereby the burgers with medium and particle sizes (5 and 10 mm) had similar scores. The burgers with the smallest particle size scored higher for tenderness, crumbliness, amount residual connective tissue but lower for overall texture, overall flavour, meaty flavour, moistness/juiciness, fattiness, overall appearance overall acceptability. The lower score for overall texture, despite significantly higher scores for the components of this (tenderness, crumblines, and amount of residual connective tissue), suggests that these burgers, although very tender, did not have the textural attributes expected beefburgers. The lack of flavour and juiciness also contributed to the poorer acceptability of these finely comminued burgers.

Table 2 summarises the analysis of variance results of the textural assessment. Degree of comminution had a significant effect on b<sup>dd</sup> Warner Bratzler and both Kramer shear measurements but no significant effect was detected by the Texture profile analysis parameters. Warner Bratzler peak force and peak energy values were similar for the burgers with the medium and large particle sizes whereas the 2<sup>mb</sup> burgers had lower values. For the Kramer shear methods both maximum load and energy increased as particle size increased.

#### Conclusion

Based on these results the least acceptable burgers were found to be those of smallest (2 mm) grind size whereas burgers minced through either the 5 or 10 mm orifice plate sizes were much closer to each other in their sensory and texture characteristics.

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acce of degree of commin	lution on mean se	Plate orifice size	SED	Significance	
_	Small	Medium	Large	which the light	
erall acceptability	27	3.3	3.4	0.15	*
erall texture	2.7	3.2	3.2	0.11	ns
derness	2.7	4 5	4.3	0.13	***
umbliness	5.7	4.5	4.4	0.21	*
<sup>10</sup> unt of residual connective	5.4 6.3	5.4	4.8	0.33	*
rall flavour	2.8	3.4	3.5	0.16	*
aty flavour	1.0	5.2	5.5	0.19	**
listness/inicipage	2.8	4 5	4.9	0.21	*
tiness	5.0	1.8	1.9	0.06	***
erall appearance	3.3	3.9	4.1	0.10	**

Table 2 Effect of degree of comminution on mean values from textural assessment of low fat beefburgers

	Plate orifice size			SED	Significance
Wan	Small	Medium	Large	wind a part of the state	nutration several of the second
Peol Bratzler	1- to be will the amount	the rest and his basis and		ANALY DEBUG AND AND A	4.4
Port force (N)	18	26	27	1.37	**
cak energy (J)	0.16	0.25	0.26	0.011	***
Kramer al			Numieral and and a		
Maximum	0.041	0.059	0.065	0.0028	**
Eneroy (In	0.041	0.058	0.005	0.0020	***
sy (J/kg)	0.16	0.28	0.33	0.000	
exture no ci					
Hardness OD	110	120	90	17	ns
pringinger	110	77	7.0	0.82	ns
Cohesing (mm)	1.3	1.1	0.59	0.024	ns
Gummi	0.62	0.59	0.38	0.024	ne
Cherriness (N)	66	70	50	8.2	113
winess (J)	490	500	370	95	ns