

Physical texture determines the satiety value of fish

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Short term control of voluntary food intake is affected by many factors which help determine the sense of satiation (control of meal size) and satiety (the time interval between feeling hungry again). A meal's satiety effect influences the control of subsequent food intake. Satiety is reported to be greater after ingestion of cooked fish compared to an isoproteinaceous meal of beef or chicken (1). Physical texture of the meal could be expected to affect its digestibility and sense of satiety.

The effect of physical texture on satiety was studied using cooked (poached for 10 min) and raw fillets of fish containing 25 g protein. Three species of fish were used in this study (spotted trevally *Seriola punctata*; blue grenadier *Macruronus novaezelandiae*; albacore *Thunnus alalunga*). Measurement of physical texture was by a fish shearing device attached to an Instron Universal Testing Instrument (2). Sensory testing of cooked fish for satiety effect was performed by fasting volunteers using a seven point satiety rating scale.

Results (see table below) show significant differences in physical texture, with cooked fish having a tougher texture than when uncooked ($P < 0.001$); fillets from Albacore (A) were tougher than Spotted Trevally (ST), with Blue Grenadier (BG) having the least tough texture. There was strong correlation between physical texture and satiety effect of the cooked fish with A having significantly greater satiety effect (greater peak height and slower decay to control values) than BG or ST.

Physical texture	Grenadier	Trevally	Albacore
Peak values (N)			
Cooked	12.8 ± 4.6	29.3 ± 5.7 d	57.4 ± 11.8 c
Raw	3.3 ± 0.8	2.8 ± 0.6 b	4.5 ± 1.8 c
Rate Values N/mm			
Cooked	1.8 ± 0.6	5.6 ± 1.8 d	10.4 ± 3.0 d
Raw	0.7 ± 0.2	0.8 ± 0.2 a	0.9 ± 0.2 a

N= Newton. Each result is a mean ± SE of 20 samples measured using circular plate on FSD.

a= not significantly different to BG, b= $P < 0.05$, c= $P < 0.01$, d= $P < 0.001$.

Digestibility of muscle protein is related to the process of denaturation involving disintegration of the muscle structure. Our results suggest that the texture of fish muscle has a significant bearing on the satiety value of cooked fish and that its physical structure may be more important in this regard than putative factors derived from protein metabolism which may affect the satiety control mechanisms. In preparing fish meals as part of a weight control programme, choice of fish type should be an important consideration.

1. Uhe AM, Collier GR, O'Dea K. Do different sources of muscle protein affect satiety differently? Proc Nutr Aust 1990;15:210.
2. Chamberlain AI, Kow F, Balasubramaniam E. Instrumental method for measuring texture of fish. Food Aust 1993;45:439-43.