MUSCLE FIBRE DIRECTION AND NOT ANIMAL AGE DETERMINES THE TENSION GENERATED BY HEATED MUSCLE STRIPS

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Two major collagenous tissues in muscle are the perimysium, which surrounds muscle fibre bundles and the endomysium, which surrounds individual muscle fibres. The perimysial collagen fibres are arranged in a well ordered criss-cross lattice at an angle to the long axis of the muscle fibres (Rowe 1974). Several studies (e.g. Snowden *et al.* 1978) have shown the maximum tension generated by collagen bundles when heated is dependent on animal age. In this study, we examined the effects of sample orientation and animal age on the tension generated by strips of muscle during heating.

Muscle strips (about 5 cm long, 1 g), cut perpendicular or parallel to the muscle fibre direction, were obtained from the M. longissimus dorsi muscles of 9 Hereford cows ranging in age from 21 to 94 months. The samples were clamped between 2 jaws mounted in a tensile testing machine which was fitted with a jacketed water bath. The bath was filled with 0.15 mol/L NaCl. The samples were heated from 25 to 90°C. Rate of temperature increase was 1.5°C/min. The temperature and the tension were recorded simultaneously.

The tension/temperature profiles obtained with samples cut perpendicular to the long axis were linear whereas the profiles obtained with samples cut parallel to the long axis were sigmoidal (Fig. 1). Furthermore, the tensions generated at 90°C by the parallel samples were between 60 and 230% higher than those generated by the perpendicular samples from the same muscle. Animal age had little or no effect on the shape of either sets of curves (Fig. 1).

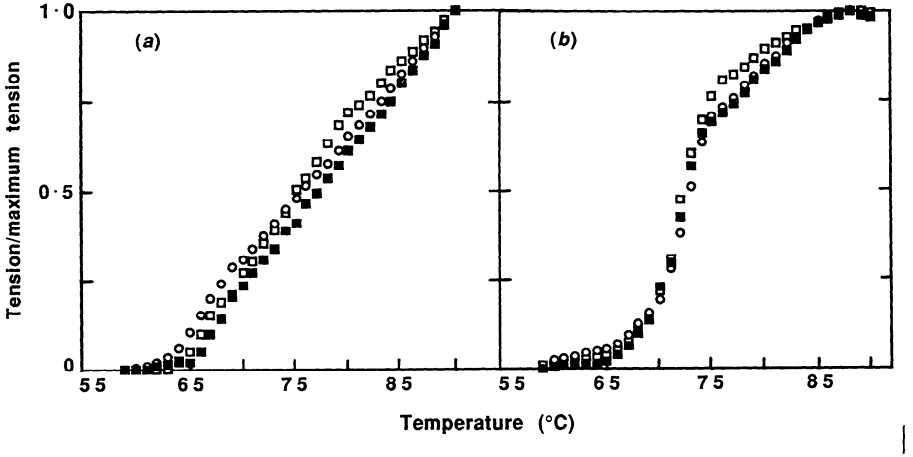

Fig. 1. *(a)* Linear tension/temperature and *(b)* sigmoidal tension/temperature curves obtained when *(a)* perpendicular and *(b)* parallel muscle strips were heated to 90°C. Cow ages were 21 (□), 46 (○) and 94 (■) months.

These findings, at least in part, provide a scientific basis for what butchers and consumers have long known and that is to slice meat across the grain for a more tender meal.

ROWE, R.W. D. (1974). *J. Food Technol. 9:* 501–8.
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