THE EFFECT OF RIGOR-TEMPERATURE ON ISOMETRIC TENSION, SHORTENING, AND pH FOR OSTRICH *M. GASTROCNEMIUS, PARS INTERNA*

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Background

A major commercial attraction of hot-deboning is the considerable reduction in time, space and refrigeration capacity required (Taylor *et al*., 1980-1981). With regard to the export of ostrich meat, a reduction in time from slaughter to vacuum packaging of muscles could be beneficial towards increased shelflife since the temperature decline in hot-deboned muscles is faster and more uniform than in muscles left on the carcass (Van Laack *et al*., 1992). The former is more beneficial for controlling microbial spoilage (Lawrie, 1985). The good eating quality of ostrich might be reduced by the risk of cold-shortening if hot-deboning is performed (Taylor *et al*., 1980-1981). Fortunately, the increased risk of cold-shortening can be avoided by controlled chilling, but it is suggested that the maximum saving in time is achieved when hot-deboning is combined with electrical stimulation. To avoid cold-shortening, it has been recommended to debone at temperatures between 5º and 15ºC and keep the vacuum packaged meat cuts at this temperature for at least 10 hours *post-mortem* (Lawrie, 1985). By measuring the sarcomere length, Sales (1994) found that cold-shortening were absent in ostrich muscles. Sales & Mellet (1996) and Sales (1994) found ostrich *M. iliofibularis* to have a very rapid pH decline until two hours *post-mortem*, after which the pH increased. Morris *et al.* (1995) found that the lowest *post-mortem* pH value for ostrich *M. iliofibularis* and *M. gastrocnemius* occurred within 30 minutes after slaughter (not hot-deboned). As illustrated by the results found by Sales and Mellet (1996), the risk of cold-shortening would be reduced in the *M. iliofibularis* since it reached a pH $\leq$ 6.20, at approximately 30 minutes after slaughter. Sales and Mellett (1996) found that the apparent ultimate pH was reached rapidly at two hours *post-mortem* in the *M. iliofibularis* (6.00 ± 0.09), and at six hours *post-mortem* in the *M. gastrocnemius, pars interna* (6.12 ± 0.06). Therefore, it was suggested that there is a risk of cold-shortening in the *M. gastrocnemius, pars interna* if this muscle would be separated from the carcass at 30-45 minutes *post-mortem*, but not in the *M. iliofibularis*.

Objectives

The aim of this study was to investigate the development of isometric tension, *i.e.* measuring tension while the muscle is prevented from contracting, and shortening in ostrich *M. gastrocnemius, pars interna* during *rigor mortis* at 7 and 37ºC respectively, in an attempt to determine the time course of rigor, pH decline, and degree and extent of shortening, *i.e.* occurrence of cold-shortening. This will allow one to decide how soon after death it would be safe in terms of eating quality to hot-debone and vacuum pack whole ostrich muscles.

Materials and methods

Ten rested, about 12 hours lairage, and two stressed ostriches, were slaughtered during February to April at the same EU approved abattoir. The two stressed ostriches were slaughtered on arrival at the abattoir. The right *M. gastrocnemius, pars interna* muscle were removed from the rested ostriches within one hour after death, and within 20 minutes from two rested and the two stressed ostriches. From these muscles, strips (1x1x3 cm) weighing between 1.5 and 3 g were cut for measurement of isometric tension, expressed as force (mN) per unit area, and shortening, expressed as percentage decrease in muscle length, during *rigor mortis* using two separate rigometers (Rigotech®) at constant temperatures of 7 and 37ºC, respectively. A SenTix 41 probe, connected to a portable pH meter 340i (WTW, GmbH & Co. KG, Weilheim, Germany), was inserted into a larger portion of muscle, which was also placed into the rigometers, for continuous measurement of pH every 10 minutes during the rigor process for a 24 hour period.