

# Surgical Outcomes of Biceps femoris Muscle Biopsy in Cattle

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## Introduction

The biceps femoris muscle is of mixed fiber-type involved in locomotion and hind limb support. Repeat sampling allows the characterization of changes between animals in their muscle fiber type that occur with maturation. The transition of muscle fiber type as a result of dietary treatments or exposure to growth promoters can be characterized through sampling of this muscle. The biceps femoris is a large muscle (~30 lb or 13.6 kg/carcass) component of the outside round of moderate retail value. There is economic value in targeting this muscle for improvements in tenderness, water-retention, color and marbling. We report outcomes on 78 cattle that underwent a simple, novel surgical biopsy procedure for analysis of carcass growth characteristics as part of a high versus low efficiency EPD selection of sires study.

## Materials and Methods

Cattle were vaccinated with an 8-way clostridial vaccine (Ultrabac 8, Pfizer Inc.), weighed, and examined three times prior to surgery. On the day of surgery (day 0), a 30 cm X 30 cm square area overlying the muscle was shaved and prepped following standard techniques. Analgesia was obtained by injection of 20 ml of 2% lidocaine hydrochloride in an inverted L pattern. A 10 cm oblique skin incision was made over the biceps femoris muscle approximately 15 cm off of the animal's midline. A Wheatlander's retractor was used to open the incision and a 2 X 2 X 2 cm muscle biopsy was obtained using dissection with a Metzenbaum scissor. The muscle was brought into apposition using O chromic gut suture in an interrupted cruciate pattern. Skin was closed using 0 Braunamid suture in a continuous ford interlocking suture pattern. The wound was sprayed with an antiseptic solution (Granulex Spray, Pfizer Inc) and bandaged. Daily rectal temperatures were obtained on days 1-3 and day 10. Upon suture removal (day 10) the wound was objectively scored for healing on a 1 to 5 scale (1=healed-5=dehiscence). Upon slaughter (90 days post-surgery) the healed surgical site was measured to quantify gross lesion volume. A subset (n=5) was submitted for descriptive histological analysis of wound

healing. Simple descriptive statistical measures were used to evaluate the data.

## Results

There were 78 biceps femoris muscle biopsies performed in this study. Eighteen cattle (n=18) were twice biopsied from opposing muscles. The mean objective wound scores were 1.12 +/- 0.33. The distribution of individual wound scores were 73 number 1's, five number 2's, and zero numbers 3-5. The mean rectal temperatures +/- SD by day of animals in the study were not significantly different ( $P < .01$ ). Day -1 = 103.28 +/- 0.54 F, day 1 = 102.47 +/- 0.65 F, day 2 = 102.15 +/- 0.59 F, day 10 = 102.54 +/- 0.51 F (day -1 = 39.60 +/- 0.30 C, day 1 = 39.15 +/- 0.36 C, day 2 = 38.97 +/- 0.33 C, day 3 = 39.02 +/- 0.24 C, day 10 = 39.19 +/- 0.28 C). Upon slaughter (n=21), the mean cubic volume of the healed muscle lesions were 431 mm<sup>3</sup> +/- 310 mm<sup>3</sup>. The histologic diagnosis of post-mortem samples was fibrosis with neovascularization, locally extensive, moderate to severe, skeletal muscle consistent with wound healing. During the post operative period (10 days) 3 of 78 animals received parenteral antibiotics (2 g Excede™ intra auricular) for fever of unknown origins. There was no significant adverse reaction to the biopsy procedure in any of the animals in this study.

## Significance

The effect of this sampling on animal health, future growth, and ultimate value of the retail cut were negligible with no adverse outcomes as a result of this technique. This protocol facilitates studies towards establishing the most appropriate means for improving the retail value of this cut, including susceptibility to the effects of marinades, aging, pre-mortem production practices, and genetic selection for specific traits that promote meat quality. Modest improvement in this relatively large, modestly valued muscle represents a realistic manner to increase overall beef carcass value. A surgical biopsy, as outlined in this protocol, is the best manner to characterize the efficacy of trials directed at improvement of this muscle attributes.