THE EFFECTS OF ANABOLIC AGENTS ON THE FIBERS OF THE

L. dorsi MUSCLE OF MALE CATTLE

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Summary

Samples of longissimus dorsi muscle were taken from carcasses of steers, steers implanted with anabolic agents and from bulls, of Friesian and Charolais cross Friesian breeds of cattle. Percent and mean cross-sectional areas (CSA) of three myofiber types (βR, αR, and αW) were determined.

The percentage of βR myofibers did not vary significantly with treatment. The implanted steers had 26% more αR and 8% less αW myofibers than the untreated steers, while the bulls had 33% more αR and 20% less αW myofibers than the implanted steers (P < 0.001).

In the implanted steers the mean CSA of the βR myofibers was significantly greater than that of the untreated steers, but did not differ from that of the bull. The mean CSA of the αR myofibers increased considerably with treatment, but only that of the bull was significantly greater than that of the untreated steer. The mean CSA of the αW myofibers in the implanted steer was identical with that of the untreated steer and significantly smaller than that of the bull. In comparison to the untreated steers, significant hypertrophy of all three myofiber types

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occurred in bulls.
These findings demonstrate a significant increase in the oxidative capacity of the longissimus muscle when the levels of both endogenous and exogenous anabolic agents are increased. They are also consistent with the greater efficiency of deposition of protein obtained, with implanted steers and bulls. No evidence of myofiber abnormality was found in any of the samples examined.

Introduction

Anabolic agents are used in meat production to increase growth rate, feed conversion to protein and the lean meat content of carcasses (Galbraith and Topps, 1981). Thus, while the value of anabolics for meat production is well established, rather little is known about the effects these substances have on the muscle fibers of meat animals. Indeed, basic factors which limit the rate and extent of muscle growth and protein synthesis as well as those concerned with adipocytes and fat deposition in meat animals have not been defined. An understanding of these factors in cellular and molecular terms would permit a greater manipulation by scientists to optimise meat production.

Studies on the effects of anabolic agents on the muscle fiber types of meat animals are few. Fox et al. (1973) found that the ratio of oxidative (red) to anaerobic (white) myofibers in the longissimus dorsi muscle of Charolais-Hereford steers was not significantly affected by Tapazole (1-methyl-2-mercaptoimidazole), a feed additive which increases weight gains and feed efficiency in beef. Spender et al. (1980) observed a sex effect when they found that the proportion of oxidative fibers in the biceps femoris muscle of heifers was significantly greater than in the same muscle from steers. In both of these studies, however, a non-specific oxidoreductase reaction (NADA : tetrazolium oxidoreductase) was used to identify oxidative myofibers. There is, therefore, a need for a more detailed