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Influence of Feed Quality on Growth Regulating Factors in Skeletal Muscles on Calves

Muscle mass is regulated not only by growth factors such as Insulin-like growth factor I (IGF-I) but also by inhibiting factors. Myostatin (GDF-8) is a member of the TGF- β superfamily of secreted growth and differentiation factors that play important roles in regulating embryonic development and tissue homeostasis in adults. Early growth is an important period in the development of skeletal muscle in cattle, although it is not known whether different qualities of feed influence the expression of myostatin mRNA in skeletal muscle *in vivo* or not. The purpose of this study was to evaluate the influence of feed quality on calves by investigating the expression of myostatin mRNA in skeletal muscle and IGF-I concentration in blood plasma.

All Holstein cows were fed artificial milk until 2 months of age. After that, these animals were divided into two groups: one was fed only roughage (group R, n=4). The other group was fed concentrate (group C, n=5). At 2 and 5 months of age, muscle samples were taken from the *M. longissimus thoracis* (LT) and *M. biceps femoris* (BF) by biopsy. The frozen muscle materials were crushed and dissolved using ISOGEN, after which the total RNA was extracted from each sample. Semi-quantitative analysis of reverse transcriptase-polymerase chain reaction (RT-PCR) to measure the expression of myostatin mRNA was performed on each sample, and the ribosomal protein L7 (RPL7) was used as an internal standard. At 3 and 5 months of age, blood samples were taken from the jugular vein of cattle. IGF-I concentration was measured.

At both 2 and 5 months of age, there were no significant differences in the expression of myostatin mRNA between groups R and C. However, the expression of myostatin mRNA seemed to be different in LT and BF. In particular, group R at 5 months of age had a two fold greater expression of myostatin mRNA in LT than in BF ($P<0.05$), and in group C, the expression of myostatin mRNA wasn't significantly different between LT and BF. At both 3 and 5 months of age, IGF-I concentration was higher in group C ($P<0.05$). Above all, at 5 months, IGF-I concentration in group C was 13.5-fold greater than that of group R. When comparing calves at 3 and 5 months of age, the IGF-I concentration in group R didn't significantly change during the 2 months period, and increased 4.9-fold in group C ($P<0.01$).

From this study, it was clear that the expression of myostatin mRNA was not influenced by feed quality. During the early growth period, growth factors such as IGF-I affected by nutritional levels were more important than myostatin and regulated the growth of the whole body. Under normal conditions of nutrition, we found that myostatin was not a limiter of growth.

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