



Effects of Metabolic Imprinting: Influence of Feed Quality during Early Growth Stage on Gene Expressions Related to Meat Quantity in Holstein Steers

Tomiko Fumita¹, Tetsuji Etoh¹, Keisuke Hayashi¹, Jochen Wegner², Hisao Iwamoto¹, Takafumi Gotoh¹

¹Kuju Agricultural Research Center, Faculty of Agriculture, Kyushu University, 8780201, Kuju, JAPAN

²Research Institute for Biology of Farm Animals, 18196 Dummerstorf, GERMANY

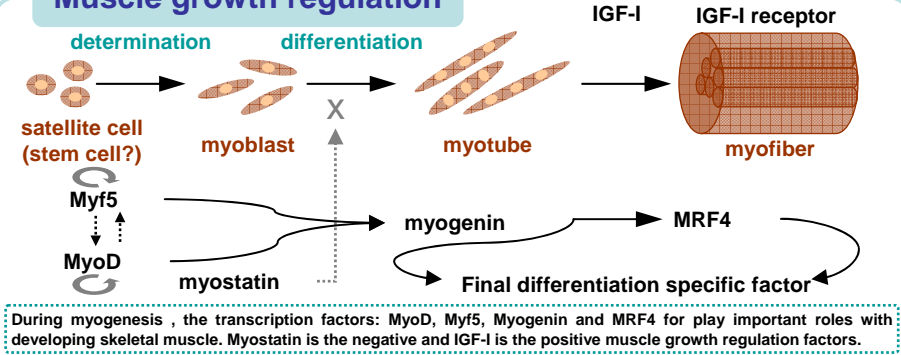
Introduction

Now in Japan, there are many problems in beef production system. To reconstruction of good quality and safe beef production system, we are trying to regulate the constitution and fatten by grass.

Recently, it has been reported that the alterations in fetal and early growth stage nutrition and endocrine status may result in developmental adaptations that permanently change the structure, physiology, and metabolism in adult life in rats, mouse and human. However, there are no reports in cattle.

The purpose of this experiment is to investigate the influence of the effects of feed quality during early growth stage to mRNA expressions of muscle growth regulating factors in skeletal muscle in Holstein steers.

Muscle growth regulation



Conclusions

The feed quality during early growth stage influences the expressions of mRNA affecting to muscle growth, myofiber type composition and myofiber diameter. The pattern of the mRNA expression was different between muscles. High feed quality during early growth stage might have an effect on the development of muscle and make body size bigger although the fed changed. It may be suggested that the constitution which get in early growth stage maintain in adult.

Materials and Methods

Animals

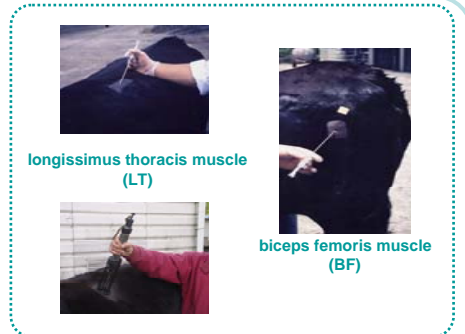
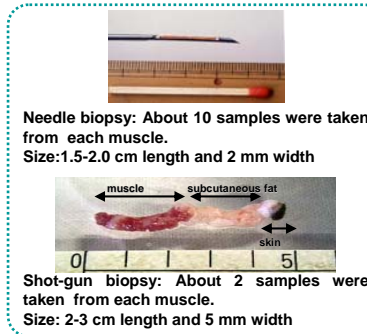
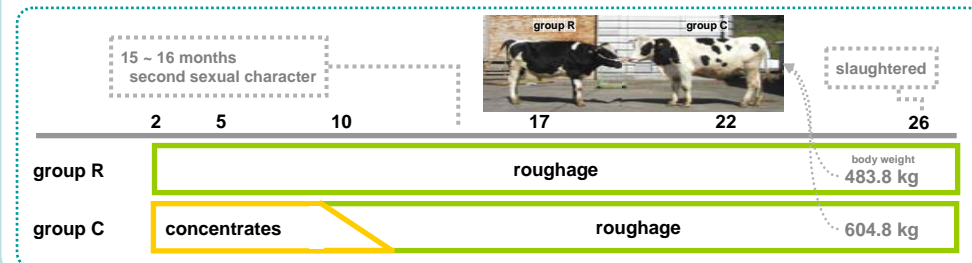
nine Holstein steers
artificially nursing until they were 2 months of age

Groups

Group R (n=4) fed only roughage until slaughtered.
Group C (n=5) fed concentrates from 2 to 10 months of age and fed only roughage until slaughtered.

Sampling

at 2, 5, 10, 17 and 22 months of age



Analysis

1) RNA expression

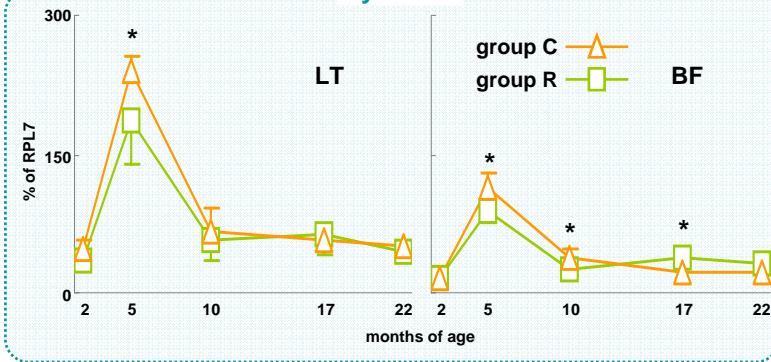
Semi-quantitative RT-PCR
myostatin, IGF-I, IGF-I receptor, MyoD, Myf5, myogenin, MRF4
internal control - ribosomal protein L7 (RPL7)

2) enzyme histochemistry

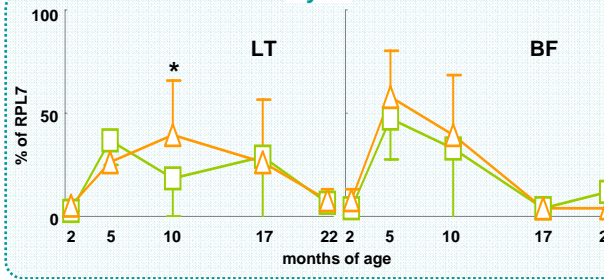
myofiber type composition
myofiber type diameter

Results

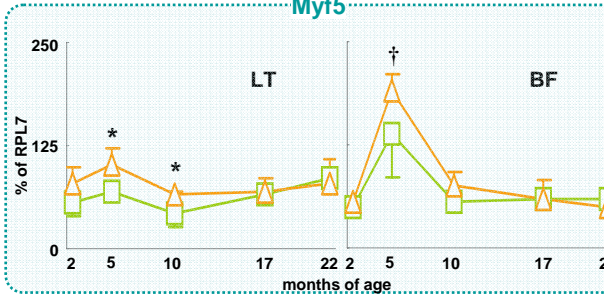
myostatin



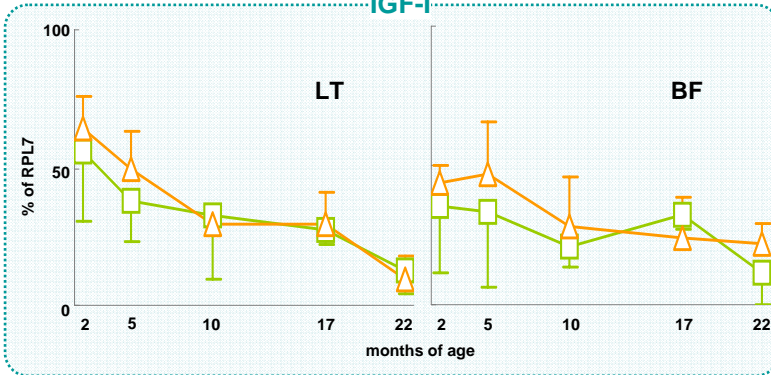
MyoD



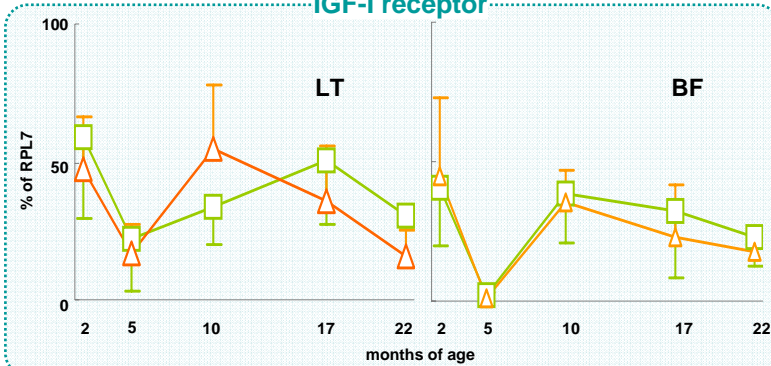
Myf5



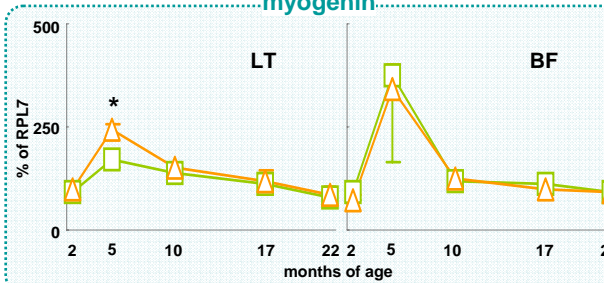
IGF-I



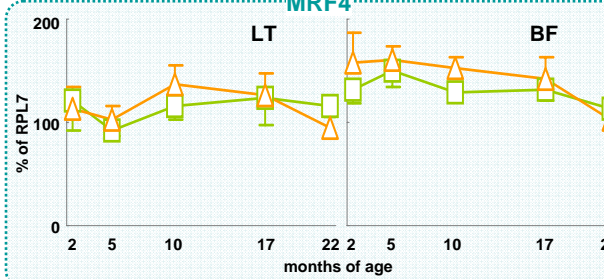
IGF-I receptor



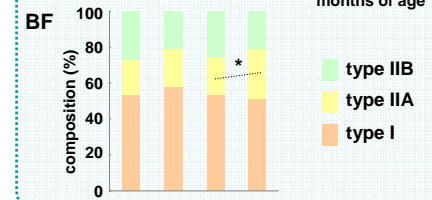
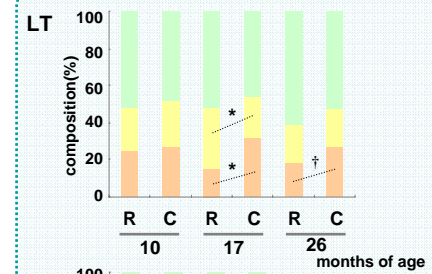
myogenin



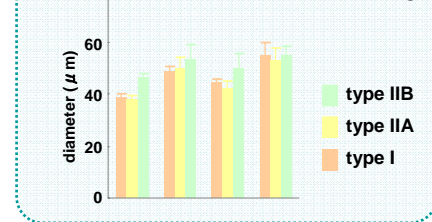
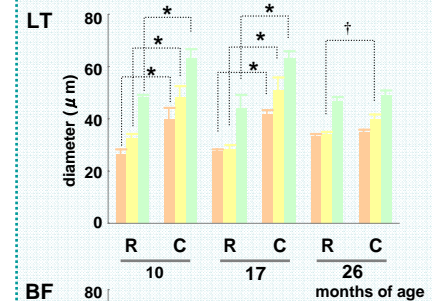
MRF4



myofiber type composition



myofiber diameter



significant difference between groups
* P < 0.05
† P < 0.1