

Differences in muscle and fat accretion in Japanese Black and European cattle¹**T. Gotoh^{*}, E. Albrecht^{†,2}, F. Teuscher[†], K. Kawabata[‡], K. Sakashita[‡], H. Iwamoto^{*}, and J. Wegner[†]**^{*} Kuju Agricultural Research Center, Kyushu University, 878-0201, Kuju-cho, Oita, Japan[†] Research Institute for the Biology of Farm Animals, D- 18196, Dummerstorf, Germany[‡] Kagoshima Prefectural Livestock Experiment Station, 899-4461 Kokubu-shi, Kagoshima, Japan

ABSTRACT: The development of muscles and different adipose tissues within the carcass and the development of i.m. fat were investigated in Japanese Black (JB) during growth compared with three European breeds, double-muscled Belgian Blue (BB), German Angus (GA), and Holstein-Friesian (HF). Animals were reared under typical conditions for Japanese and European beef production systems. The carcass composition at 24 mo of age differed among breeds although the BW was similar. The carcass of JB contained more adipose tissue and the least proportion of muscle compared with the European breeds. On the other hand, BB was characterized by only a small mass of the adipose tissue and the greatest weight of skeletal muscle. Among the other three breeds, JB produced the largest LM and conversely the smallest semitendinosus, gluteobiceps, and triceps brachii muscles regardless of the same absolute weight of total muscle. The LM of JB gained weight by extraordinary development of i.m. adipose tissue (23.3% at 24 mo of age) compared to the European breeds (0.6% to 4.7%). However, the 9.0% i.m. fat content in the semitendinosus muscle of JB could not contribute to a muscle weight superior to those of GA and HF. In JB the adipose tissue development resulted in an increase of the marbling fleck area in the LM and by fusion of marbling flecks in a reduction of the number of marbling flecks. In semitendinosus muscles, an increase of both size and number of adipocytes was observed. The linear relationships between i.m. fat content in the LM and subcutaneous, intestinal, omental, and perirenal adipose tissue weights indicate that a large amount of waste fat is accreted with every percent of i.m. or taste fat. However in JB, quadratic regression equations fitted best the relation between i.m. fat content and omental and perirenal adipose tissue weight. The good ability of i.m. fat deposition in JB with relatively least development of waste fat is a result of optimized nutrition and unique breed characteristics of JB.

Key words: adipose tissue, cattle, European breeds, Japanese Black, marbling, muscle

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