Adaptations in muscle fiber characteristics and effects on meat quality traits induced by free-range rearing conditions in pigs

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Abstract. The aim of this research was to determine whether outdoor free-range versus indoor confinement rearing affects meat quality and muscle fiber characteristics. This study used 12 gilts and 12 barrows from six Large White litters for the growth range from 25 to 105 kg. Each litter was equally split into two groups of pigs with one reared indoors (I) in individual pens (2.56 m^2) and the other group reared outdoor (O) from December to March on a fallow arable plot of land (9200 m^2). Both groups had free access to the same grower-finisher diet that met Swiss requirement estimates. At slaughter, samples from the longissimus (LM), the light (STL) and dark (STD) parts of the semitendinosus (ST) and the rectus femoris (RF) were obtained from the right side of all pigs. Muscle fibers were stained and classified on the basis of stain reaction as SO, FOG, FG and fiber area and distribution subsequently determined. In addition carcass characteristics as well as pH_i, pH_u, Minolta L*, a*, b* values, drip losses, glycolytic potential (GP) and i.m. fat of each muscle were assessed. The O-pigs had lower ADG (795 vs. 938 g) and leaner carcasses (58.4 vs. 56.2%) ($P < 0.01$ for each). Rearing conditions did not affect i.m. fat content of the ST, but i.m. fat was lower in the LM (1.9 vs. 2.4%) and higher in the RF (1.6 vs. 1.4%) of O-pigs ($P < 0.01$). The GP of all muscles was higher ($P < 0.01$) and pH_u lower ($P < 0.01$) in the O-pigs. In the LM of the O-pigs, but not in the other muscles, L* values (47.2 vs. 48.8) were lower and drip losses (2.1 vs. 1.8%) were higher ($P < 0.01$). The SO fibers of the LM (2430 vs. 2936 mm^2) and STL (2703 vs. 3558 mm^2) tended to be smaller ($P < 0.09$) in the O-pigs. Rearing conditions had little affect on STR and RF fiber area. In the O-pigs, LM and RF had more FOG (LM: 26.0 vs. 20.8%; RF: 39.7 vs. 32.0%) and fewer FG fibers (LM: 62.3.0 vs. 68.4%; RF: 56.2 vs. 62.9%), while STL had fewer SO (3.3 vs. 6.6%) fibers compared to I-pigs. SO, FOG and FG distribution was correlated with L* (-0.29; -0.38; 0.41), a* (0.37; 0.44; -0.50), b* (0.17; 0.29; -0.28) and GP (-0.36; -0.34; 0.42). These results suggest rearing pigs outdoors increases aerobic capacity of glycolytic muscles but has little concomitant influence on meat quality traits.

J. Anim. Sci. (Suppl. 1) **85,** 128