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Heart size and mean muscle fibre cross-sectional area related
to birth weight in pigs

Keywords Pig, birth weight, heart, fast-twitch muscle, slow-twitch
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Abstract

One of the aims in domestic pig breeding has been to increase the size of litters resulting in variation in birth weight of piglets. Pig breeding has also resulted in increased body muscle mass. Muscles with the same size can consist either of large number of thin muscle fibres or small number of thick muscle fibres. Larger body muscle content means that in living animal the heart must pump blood to larger muscle mass than earlier. Our interest in this study was to investigate the relationship between the pig's birth weight and (i) growth performance and carcass composition, (ii) the size of organs, and (iii) the mean muscle fibre cross-sectional area at slaughter. The study consisted of twenty pigs slaughtered at the age of 165 ± 2 days. The day after the slaughter, the carcass composition was determined by dissecting the chilled carcass into lean, fat, bones, and skin and organs were weighed. The average cross sectional area of muscle fibres was determined from three fast-twitch muscles longissimus dorsi, semimembranosus, gluteus superficialis, and two slow-twitch muscles infraspinatus and masseter. The birth weight of pigs ranged from 0.9 to 2.2 kg. We found no clear relationships between the birth weight and the pig's growth performance from birth to slaughter. When the birth weight increased the heart weight at slaughter increased as well ($P < 0.01$). The heart weight was higher in those pigs with high carcass weight ($P < 0.05$) and with the high weight of total muscle mass in the carcass ($P < 0.001$). The cross sectional area of muscle fibres in M. longissimus dorsi ($P < 0.05$), M. semimembranosus ($P < 0.10$), and M. gluteus superficialis ($P < 0.05$) was larger in those pigs with low birth weight compared to those found in pigs with high birth weight.

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