The Effect of Level of Dietary Iron on Pork Muscle Characteristics

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Muscle color is an important factor affecting shoppers' choice of prepackaged meats from self-service display cases. The effect of several levels of dietary iron and of two levels of a chelating agent on pork muscle characteristics was studied.

Procedure

Bic swine (20 of each) averaging 46.5 pounds and representing Duroc, Poland and Duroc-Polish crosses breeding, were divided into five lots so that sex and breed were equally represented in all lots. The following rations were fed:

Lot 1—Control: Sorghum xratia (100), 180 lb.; soybean oil meal, 45 lb.; meat scrap, 50 lb.; alfalfa meal, 50 lb.; indurated salt, 5 lb.; vitamin A, 100,000 I.U.; B complex vitamins (Murok 50-A), 0.5 lb.; Apatite 1-4-4, 5 lb.; MnSO4·5H2O, 100 gms.

Lot 2—Control ration plus 0.1% Na2EDTA (ethylene diaminetetraacetate)

Lot 3—Low iron ration consisting of: Ground corn, 675 lb.; dried skim milk, 368 lbs.; ground limestone, 6 lbs.; indurated salt, 5 lbs.; vitamin A, B complex vitamins, Apatite and MnSO4·5H2O at same levels as above.

Lot 4—Low iron ration consisting of: Ground corn, 675 lb.; dried skim milk, 368 lbs.; ground limestone, 6 lbs.; indurated salt, 5 lbs.; vitamin A, B complex vitamins, Apatite and MnSO4·5H2O at same levels as above.

Lot 5—Control ration plus 2.5% Na2EDTA

Lot 6—Control ration plus 2.5% Na2EDTA

A diet additive was added to rations of Lots 2 and 3. This additive may affect iron utilization and thus affect muscle quality. The low iron ration contained about one-third the recommended allowance. A high level of iron and copper was added to Lot 5 ration. Rations were pelleted and fed free choice to pigs in concrete-floor feeding pens. Water was softened, so essentially no iron was available from it. Animals were individually taken off feed at 200 pounds live weight and slaughtered after being held 24 hours. Blood hemoglobin was determined on blood taken at slaughter and liver and spleen weights were taken. After a 24-hour chill, carcasses were cut by standard methods. Muscle color intensity was determined on the longissimus dorsi (loin eye) muscle, psoas major (lumber) and brisket (ear muscle). Muscle pH, myoglobin, moisture, total nitrogen and ash were determined on the above three muscles plus the semimembransus and rectus femoris (2 hind muscles).

Results

Pigs receiving the ration containing added iron and copper gained faster than controls or those receiving EDTA. Pigs on the low iron ration gained faster than those receiving 0.5% EDTA and showed the highest feed efficiency. Liver and spleen weights were not significantly affected by treatment, perhaps because variation was high between individuals within lots. Blood hemoglobin was reduced by ration EDTA and increased by added iron and copper. Pigs receiving high levels of iron and copper (Lot 5) showed darker muscles and higher concentration of the muscle pigment, myoglobin. No significant treatment differences were demonstrated in moisture, total nitrogen or ash content of the muscles. Added iron and copper tended to cause a desirable color in pork muscle.