The Effect of Level of Dietary Iron on Pork Muscle Characteristics (Project 524-D).

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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

Barrows and gilts (20 of each), averaging 40.5 pounds and representing Duroc, Poland and Duroc-Poland cross 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 grain (milo), 790 lbs.; soybean oil meal, 95 lbs.; meat scraps, 50 lbs.; alfalfa meal, 50 lbs.; iodized salt, 5 lbs.; vitamin A, 400,000 I.U.; B complex vitamins (Merck 58-A), 0.5 lb.; Aurofac 1.8-1.8, 5 lbs.; $MnSO_4.H_2O$, 100 gms.

Lot 2—Control ration plus 0.1% Na_2Ca EDTA (ethylenediaminetetraacetate) ration.

Lot 3—Control ration plus 0.5% Na_2Ca EDTA.

Lot 4—Low iron ration consisting of: Ground corn, 675 lbs.; dried skim milk, 305 lbs.; ground limestone, 5 lbs.; iodized salt, 5 lbs.; vitamin A, B complex vitamins, Aurofac and $MnSO_4.H_2O$ at same levels as above.

Lot 5—Control ration plus 2786.8 gms. $FeSO_4.7\ H_2O$ and 209 gms. $CuSO_4$ per 1,000 lbs. ration.

EDTA chelating agent 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 half 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-floored 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 (tenderloin), and biceps femoris (a ham muscle). Muscle pH, myoglobin, moisture, total nitrogen and ash were determined on the above three muscles plus the semimembranosus and rectus femoris (2 ham 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 seemed to cause a desirable color in pork muscle.

The Effect of Processing Pork Carcasses Prior to Rigor Mortis upon Muscle and Fat Quality.

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The effect of processing pork carcasses before rigor mortis was studied in 21 market-weight swine. The left side of each carcass served as a control and was chilled for 48 hours at 32-36°F. before being cut and processed by regular methods. The right sides (treated) were cut and processed within one hour of bleeding. Right hams were pumped with a 65° mixed pickle and cooled with iced pickle. Right loins were either placed in a chill room or in a blast freezer after being cut. Roasts removed from the hams and chops from the loins were cooked in a rotary oven. Selected fatback samples were rendered and lard samples analyzed for iodine number and free fatty acid value over 21 and 18 weeks, respectively, to determine whether treatment affected lard stability with storage at 70°F. Treated hams had significantly lower total cooking losses and drip losses than control hams. Muscles from the treated hams and from loins removed before rigor mortis and chilled were significantly tenderer as tested by shear force values of cooked samples. However, opposite results were noted for loins removed before rigor mortis and frozen. The frozen loins were less tender and had significantly higher expressible moisture than controls. Loin treatment had no significant effect on cooking losses, ether extract or total moisture. Treatment had no significant influence on fat stability as tested by iodine number or free fatty acid number after storage up to 21 weeks at 70°F.