THE EFFECTS OF PORCINE SOMATOTROPIN ADMINISTRATION AND GENDER ON COOKING PROPERTIES AND PALATABILITY ATTRIBUTES OF PORK MUSCLE

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BACKGROUND

Considerable controversy appears to exist regarding the influence of gender and porcine somatotropin (PST) on cooking and palatability attributes. The present study was designed to assess the influence of prolonged-release and daily PST injections and gender on the cooking and palatability attributes of uncured longissimus (LD) and cured and smoked semimembranosus (SM) muscle.

EXPERIMENTAL

Animals and Management. Yorkshire pigs (60 barrows and 60 gilts) were assigned randomly within gender to three treatments, at body weights ranging from 67 to 75 kg. Each treatment group consisted of 10 pens of four pigs (5 pens of gilts and 5 pens of barrows) with pens assigned randomly. Treatments were as follows: 1) control (placebo implants), 2) prolonged release PST implants (2 mg/day), (Monsanto product: CP115409-F), or 3) daily, subcultaneous injections in the neck of 2 mg/day (Monsanto product: CP 115409). Both treatments and genders were randomly assigned to pens. All animals received a 17% crude protein barley/wheat based diet ad-libitum, which met or exceeded NRC (1988) nutrient recommendations. Free access to water was also available. A two week conditioning period to the test diet was also provided. Animals received PST treatments from a body weight of 70 $\pm$ 5 kg to 96 $\pm$ 5 kg or for no more than 49 days. This resulted in animals being on test at least 28 days. All animals were weighed and feed intake on a pen basis was recorded on a weekly basis.

Slaughter and Sample Preparation. Upon reaching slaughter weight, each animal was weighed and transported approximately 0.5 km to the abbatoir. Slaughter simulated commercial conditions. At 24 hours postmortem carcasses were separated into primal cuts. The right ham and a portion of the right LD muscle from the lumbar section were removed from each carcass. The hams were then cured and smoked using simulated commercial procedures. A center ham steak (1.9 cm thick) was then cut perpendicular to the longitudinal axis of the femur in each ham, 1.9 cm posterior to the tip of ischium.

Sensory Evaluation. Prior to cooking, all samples were weighed and a saber thermocouple was inserted in their geometric centre. LD roasts were roasted to an internal temperature of 75°C, and ham steaks were roasted to an internal temperature of 60°C in a conventional electric oven preheated to 177°C. After cooking all cuts were reweighed to determine total cooking losses. Cooking times were recorded. LD roasts were subsampled by cutting them into 1.9 cm thick slices, removing all subcutaneous and intermuscular fat and epimysium, and cutting into cubes (1.9 cm^2). Ham steaks were subsampled by removing the SM muscle trimming it of all subcutaneous and intermuscular fat and epimysium, and cutting it into cubes (1.9 cm^3). Cubes were then randomly allocated to panelists by placing them into designated glass containers in a circulating water bath (70°C). All samples were evaluated by an eight member laboratory panel screened and trained according to AMSA Guidelines (AMSA, 1978). Samples were evaluated for initial and overall tenderness, amount of perceptible connective tissue, juiciness, and flavour intensity using 9-point descriptive scales (9=extemely tender, no perceptible connective tissue, extremely juicy and extremely intense pork flavour; 1=extremely tough, abundant connective tissue, extremely dry and extremely bland pork flavour), and for flavour desirability and overall palatability, using a 9-point hedonic scale (9=extremely desirable; 1=extremely undesirable). One sample from each treatment/gender subgroup within each cut was evaluated at each panel session. All panel sessions were conducted in well ventilated booths under 538 lux of incandescent light. Distilled water at room temperature, and unsalted soda crackers were provided to remove residual flavours between sample evaluations.

Data Analysis. Data were analyzed using the general linear model of SAS (SAS, 1985) and a model containing PST treatment and gender as main effects and the interaction.

RESULTS

The only treatment/gender, two way interaction observed to be significant ($P<0.05$) was for initial tenderness of the cooked loin, which arose as a result of samples from control pigs being rated higher (4.71) than samples from pigs receiving the prolonged release PST treatment (3.71) in barrows and samples from pigs receiving daily PST injections being rated higher (4.70) than samples from control pigs in gilts (3.71). However, the magnitude of these observed differences, indicated this interaction to be of limited practical significance. No differences in cooking properties or palatability ratings attributable to gender were observed ($P>0.05$). However, cured and smoked SM muscles from pigs receiving daily PST injections were more tender both initially and overall ($P<0.05$) than their counterparts from control pigs (Table 1). In addition, the cured and smoked SM muscles from pigs receiving daily PST injections had less perceived connective tissue than their counterparts from control pigs and pigs receiving the prolonged release PST implants (Table 1). In contrast, the cooked loins from pigs receiving the prolonged release PST implants were perceived to contain less connective tissue than their counterparts from control pigs and pigs receiving daily PST injections. However, cooked loins from pigs receiving the prolonged release PST implants had less desirable flavour ($P<0.05$) than their counterparts from pigs receiving daily PST injections (Table 1). It should be noted, however, only the tenderness differences observed in the cured and smoked SM were of sufficient magnitude to be of practical importance.

DISCUSSION

Consumers have demanded leaner meat products over the past five decades. Consequently, reducing the proportion of fat and increasing the proportion of lean has been a major priority for the livestock and meat industries. Although substantial progress has been made over the past several decades in improving the leanness of pork, more progress must be made. Unfortunately, traditional breeding and selection programs have been capable of removing only about 0.5 mm of backfat per year. Therefore, such progress is generally considered too slow to respond effectively to market demands. It has been clearly demonstrated porcine somatotropin (PST), is capable of improving both growth and feed efficiency by approximately 10%, increasing carcass lean content by 10% on average, and reducing carcass fat content by 10 to 20%. Therefore, use of PST is clearly consistent with consumer demands and the industry's desire to improve carcass leanness. Based upon available evidence it is estimated PST could improve lean yield by about 3 kg/carcass or increase the annual Canadian lean pork production by about 48 million kilograms (Jones *et al.*, 1994).

The composite results of the present study indicate PST treatments, particularly 2 mg/day daily injections can be utilized to improve production, carcass, and meat quality traits, without adversely influencing cooking or palatability attributes. Such treatment may also improve the tenderness of cured and smoked ham muscle.

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Table 1. Means and standard errors for palatability attributes and cooking properties for samples from animals receiving different treatments

	Treatment					
	Control		Daily		Prolonged	
Trait	Mean	S.E.	Mean	S.E.	Mean	S.E.
	Ham					
Initial Tenderness	5.61[b]	0.22	6.47[a]	0.22	6.22[ab]	0.23
Overall Tenderness	5.54[b]	0.22	6.54[a]	0.22	5.97[ab]	0.23
Amount of Perceptible Connective Tissue	6.05[b]	0.17	6.67[a]	0.17	6.06[b]	0.17
Juiciness	5.32	0.26	5.06	0.26	5.58	0.26
Flavour Desirability	5.62	0.21	5.82	0.21	5.78	0.21
Flavour Intensity	6.12	0.18	6.12	0.18	6.00	0.18
Overall Palatability	5.20	0.19	5.46	0.19	5.56	0.20
Percent Total Cooking Loss	6.99	0.39	6.92	0.39	7.74	0.40
Cooking Time (min/kg)	24.67	0.95	23.68	0.95	25.46	0.97
	Loin					
Overall Tenderness	4.29	0.23	4.25	0.26	3.88	0.23
Amount of Perceptible Connective Tissue	6.07[a]	0.20	5.93[a]	0.23	5.27[b]	0.20
Juiciness	4.14	0.20	3.55	0.22	3.86	0.20
Flavour Desirability	5.14[ab]	0.16	5.28[a]	0.17	4.79[b]	0.15
Flavour Intensity	5.14	0.16	5.15	0.18	5.12	0.15
Overall Palatability	4.64	0.16	4.62	0.18	4.26	0.16
Percent Total Cooking Loss	25.02	0.85	24.30	0.94	23.27	0.83
Cooking Time (min/kg)	167.20	4.61	169.30	5.10	164.59	4.46

[a,b] Means in the same row without a superscript or bearing a common superscript do not differ significantly (P>0.05).