Effect of genotype on mineral content of different muscles (LT, ST, PM)

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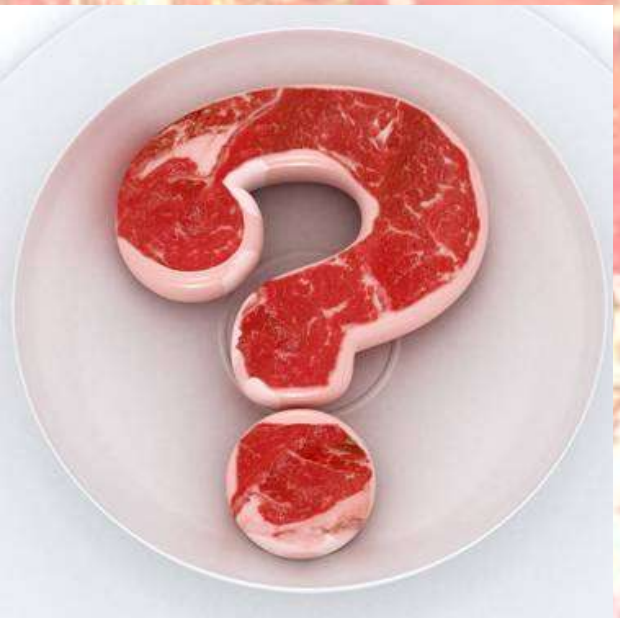
Objectives

To determine the effect of genotype on the mineral content of three different muscles (*longissimus thoracis*-LT, *semitendinosus*-ST, *psoas major*-PM)



Materials and methods I.

Six different genotypes

Angus (A)

Charolais (CH)

Holstein (H)

Hungarian Grey (HG)

Hungarian Simmental (HS)

Charolais x Hungarian Grey (CHxHG)

Fed under the same conditions (ad lib. maize silage and grass hay, concentrate).

At the finishing period concentrate contained 25 % linseed supplementation.

The final live weight was determinate at 600 kg.

Materials and methods II.

Meat samples from three bovine muscles (*longissimus thoracis –LT, semitendinosus-ST, psoas major-PM*) were taken from the right half carcasses after 24hrs chilling

Laboratory test:
Kaposvár University, Faculty of Animal Science, Analytical Laboratory

Na, Ca, K, Fe, Mg, Cu, Zn and Mn content (mg/1000 g tissue) were determined by atomic absorption or spectrophotomethry

Statistical analysis was made by using SPSS 10.0 softwer.

Results

Mineral content (mean$_{sd}$) of *longissimus thoracis* muscle by genotypes (mg/1000g)

	A	CH	H	HG	HS	CH x HG	Mean
Ca	$40_{10.22}^{ab}$	$34_{9.74}^{a}$	$31_{3.37}^{a}$	$33_{5.55}^{a}$	$46_{18.73}^{b}$	$35_{6.44}^{a}$	**$37_{11.05}$**
P	$1794_{79.67}^{a}$	$1871_{110.68}^{a}$	$2013_{70.83}^{b}$	$1880_{87.65}^{a}$	$1884_{166.10}^{a}$	$1919_{70.03}^{ab}$	**$1891_{117.37}$**
Mg	$193_{9.49}^{a}$	$207_{15.46}^{bc}$	$213_{7.09}^{bc}$	$216_{15.22}^{b}$	$201_{13.39}^{ac}$	$210_{15.59}^{bc}$	**$207_{14.84}$**
K	$3267_{176.49}^{a}$	$3519_{174.11}^{b}$	$3425_{270.17}^{ab}$	$3287_{184.88}^{ac}$	$3485_{278.99}^{bc}$	$3294_{196.84}^{ac}$	**$3374_{229.99}$**
Na	$533_{94.45}$	$516_{73.32}$	$575_{85.35}$	$534_{84.34}$	$516_{42.94}$	$511_{83.06}$	**$530_{78.14}$**
Mn	$0.14_{0.12}^{a}$	$0.07_{0.02}^{b}$	$0.07_{0.01}^{b}$	$0.07_{0.02}^{b}$	$0.08_{0.03}^{ab}$	$0.11_{0.08}^{ab}$	**$0.09_{0.06}$**
Cu	$0.88_{0.46}^{ab}$	$0.59_{0.22}^{b}$	$1.26_{1.27}^{a}$	$0.64_{0.12}^{b}$	$0.59_{0.32}^{b}$	$0.64_{0.18}^{b}$	**$0.76_{0.58}$**
Zn	$36_{6.29}^{ab}$	$36_{6.30}^{ab}$	$41_{4.55}^{a}$	$39_{3.93}^{ab}$	$35_{3.73}^{b}$	$38_{3.66}^{ab}$	**$37_{5.00}$**
Fe	$17_{2.59}^{a}$	$17_{4.14}^{a}$	$22_{1.68}^{b}$	$21_{4.73}^{bc}$	$18_{3.50}^{ac}$	$19_{2.48}^{ab}$	**$19_{3.71}$**

$^{a.b.c}$ < P<0.05

Results

Mineral content ($mean_{sd}$) of *semitendinosus muscle* by genotypes (mg/1000g)

	A	CH	H	HG	HS	CH x HG	Mean
Ca	$32_{2.79}$	$32_{4.99}$	$34_{5.62}$	$35_{5.38}$	$33_{6.66}$	$32_{4.21}$	**$33_{5.02}$**
P	$1862_{78.97}^{a}$	$1994_{65.37}^{bc}$	$2050_{36.75}^{b}$	$1911_{78.85}^{ac}$	$1980_{88.45}^{ab}$	$1920_{146.95}^{ac}$	**$1949_{105.33}$**
Mg	$197_{9.25}^{a}$	$209_{15.43}^{ab}$	$218_{4.82}^{b}$	$220_{15.01}^{b}$	$209_{12.97}^{ab}$	$209_{19.88}^{ab}$	**$210_{15.32}$**
K	$3389_{214.15}$	$3518_{142.04}$	$3574_{59.53}$	$3450_{120.58}$	$3536_{229.41}$	$3441_{235.89}$	**$3482_{182.78}$**
Na	$564_{100.17}^{ab}$	$559_{110.14}^{ab}$	$625_{76.88}^{a}$	$545_{77.89}^{ab}$	$548_{64.16}^{ab}$	$481_{51.74}^{b}$	**$552_{88.34}$**
Mn	$0.10_{0.08}$	$0.07_{0.03}$	$0.07_{0.01}$	$0.06_{0.02}$	$0.07_{0.01}$	$0.07_{.002}$	**$0.07_{0.04}$**
Cu	$0.58_{0.32}$	$0.61_{0.29}$	$0.91_{0.38}$	$0.66_{0.19}$	$0.55_{0.16}$	$0.64_{0.44}$	**$0.65_{0.32}$**
Zn	$34_{3.81}$	$31_{4.76}$	$31_{3.21}$	$32_{3.40}$	$32_{4.72}$	$33_{4.12}$	**$32_{3.93}$**
Fe	$16_{2.84}$	$16_{4.48}$	$16_{1.47}$	$15_{2.65}$	$16_{3.10}$	$15_{2.60}$	**$15_{2.86}$**

$^{a.b.c}$ < P<0.05

Results

Mineral content ($mean_{sd}$) of *psoas major muscle* by genotypes (mg/1000g)

	A	CH	H	HG	HS	CH x HG	Mean
Ca	$27_{3.33}$	$29_{3.09}$	$27_{4.48}$	$30_{3.52}$	$29_{1.93}$	$27_{2.48}$	**$28_{3.31}$**
P	$1827_{215.93}^{a}$	$2046_{108.12}^{b}$	$2081_{109.74}^{b}$	$1945_{46.20}^{ab}$	$2008_{103.78}^{ab}$	$1927_{156.85}^{ab}$	**$1968_{152.29}$**
Mg	$199_{23.87}^{a}$	$222_{17.13}^{ab}$	$230_{8.44}^{b}$	$229_{14.75}^{b}$	$219_{14.45}^{ab}$	$221_{25.73}^{ab}$	**$220_{20.43}$**
K	$3320_{305.98}^{a}$	$3682_{182.99}^{b}$	$3612_{154.27}^{ab}$	$3375_{186.90}^{ab}$	$3530_{244.13}^{ab}$	$3346_{197.07}^{a}$	**$3469_{249.41}$**
Na	$455_{76.58}$	$497_{65.09}$	$517_{54.74}$	$516_{64.63}$	$510_{83.29}$	$477_{62.02}$	**$495._{69.22}$**
Mn	$0.09_{0.01}$	$0.12_{0.13}$	$0.09_{0.04}$	$0.09_{0.01}$	$0.10_{0.03}$	$0.11_{0.05}$	**$0.10_{0.06}$**
Cu	$0.55_{0.32}$	$0.70_{0.27}$	$0.71_{0.13}$	$0.89_{0.19}$	$0.88_{0.65}$	$0.63_{0.22}$	**$0.73_{0.35}$**
Zn	$26_{4.21}$	$26_{3.54}$	$28_{2.63}$	$28_{2.38}$	$27_{3.65}$	$28_{1.92}$	**$27_{3.14}$**
Fe	$20_{3.72}^{a}$	$20_{3.47}^{a}$	$22_{2.00}^{ab}$	$26_{3.31}^{b}$	$20_{3.70}^{a}$	$23_{3.40}^{ab}$	**$22_{3.84}$**

$^{a.b}$ < P<0.05

Results

The average mineral content ($mean_{sd}$) of examined muscles (mg/1000g)

	longissimus thoracis	*semitendinosus*	*psoas major*
Ca	$36.54_{11.05}^{a}$	$33.15_{5.02}^{b}$	$28.18_{3.31}^{c}$
P	$1891.45_{117.37}^{a}$	$1949.49_{105.33}^{b}$	$1968.30_{152.29}^{b}$
Mg	$207.19_{14.84}^{a}$	$210.21_{15.32}^{a}$	$220.02_{20.43}^{b}$
K	$3374.28_{229.99}^{a}$	$3481.72_{182.78}^{b}$	$3469.06_{249.41}^{b}$
Na	$530.34_{78.14}^{a}$	$551.94_{88.34}^{a}$	$495.17_{69.22}^{b}$
Mn	$0.09_{0.06}^{ab}$	$0.07_{0.04}^{a}$	$0.10_{0.06}^{b}$
Cu	$0.76_{0.58}$	$0.65_{0.32}$	$0.73_{0.35}$
Zn	$37.24_{5.00}^{a}$	$32.33_{3.93}^{b}$	$27.22_{3.14}^{c}$
Fe	$19.06_{3.71}^{a}$	$15.48_{2.86}^{b}$	$21.86_{3.84}^{c}$

$^{a.b.c}$ < P<0.05

Results

The average mineral content ($mean_{sd}$) of examined genotypes (mg/1000g)

	A	CH	H	HG	HS	CH x HG	Mean
Ca	$33_{8.42}$	$31_{6.68}$	$30_{5.20}$	$32_{5.28}$	$36_{13.11}$	$31_{5.69}$	$32_{8.00}$
P	$1828_{137.88}^{a}$	$1970_{119.32}^{bc}$	$2048_{80.06}^{c}$	$1912_{75.53}^{ab}$	$1957_{130.82}^{bc}$	$1922_{125.44}^{b}$	$1936_{129.98}$
Mg	$196_{15.35}^{a}$	$213_{16.81}^{b}$	$220_{9.73}^{b}$	$222_{15.48}^{b}$	$210_{14.86}^{b}$	$213_{20.72}^{b}$	$212_{17.81}$
K	$3325_{234.74}^{a}$	$3573_{178.15}^{b}$	$3537_{193.12}^{b}$	$3371_{174.90}^{ac}$	$3517_{242.93}^{bc}$	$3361_{211.74}^{ac}$	$3442_{226.25}$
Na	$517_{99.18}^{ab}$	$524_{85.54}^{ab}$	$572_{83.41}^{a}$	$532_{74.38}^{ab}$	$525_{65.32}^{ab}$	$489_{66.05}^{b}$	$526_{81.89}$
Mn	$0.11_{0.08}$	$0.09_{0.08}$	$0.08_{0.03}$	$0.08_{0.02}$	$0.09_{0.03}$	$0.10_{0.06}$	$0.09_{0.06}$
Cu	$0.67_{0.39}$	$0.63_{0.26}$	$0.96_{0.77}$	$0.73_{0.20}$	$0.67_{0.44}$	$0.64_{0.29}$	$0.71_{0.43}$
Zn	$32_{6.38}$	$31_{6.38}$	$33_{6.52}$	$33_{5.36}$	$31_{5.00}$	$33_{5.18}$	$32_{5.78}$
Fe	$18_{3.45}^{a}$	$17_{4.24}^{a}$	$20_{3.29}^{bc}$	$20_{5.64}^{b}$	$18_{3.86}^{ac}$	$19_{4.31}^{ab}$	$19_{4.35}$

$^{a.b.c}$ < P<0.05

Conclusions I.

Our results confirmed that the beef mineral richness depends on ***genotype,*** and it is related to ***muscle type,*** too.

+++: richest
---: poorest

Effect of genotype

	A	CH	H	HG	HS	CH x HG
Ca	++	-	---	+	+++	--
P	---	++	+++	--	+	-
Mg	---	-	++	+++	--	+
K	---	+++	++	-	+	--
Na	--	-	+++	++	+	---
Mn	+++	+	---	--	-	++
Cu	-	---	+++	++	+	--
Zn	-	---	++	+++	--	+
Fe	--	---	++	+++	-	+

Conclusions II.

Effect of muscle type

+: richest -: poorest

	longissimus thoracis-LT	*semitendinosus* -ST	*psoas major* -PM
Ca	+	0	-
P	0	-	+
Mg	-	0	+
K	-	+	0
Na	0	+	-
Mn	0	-	+
Cu	+	-	0
Zn	+	0	-
Fe	0	-	+