EFFECT OF BREED TYPE, SEX AND SLAUGHTER WEIGHT ON MEAT QUALITY AND CHOLESTEROL LEVEL OF PIG MUSCLES

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Background

The world pig meat consumption has increased 76.0% in the last decade and keeps growing around 2.5% per year, BRAZILIAN PORK PRODUCER (2002). This fact can be linked to the development of new breed types and the low level of cholesterol presented in pig meat (BRAGAGNOLO & RODRIGUES – AMAYA, 1995; BALES et al., 1998). Based on this consideration, the world pig production chain has the challenge to offer to the consumers a healthful and tasty meat combined to the low level of cholesterol and higher levels of lean meat percentage aiming to ensure the economic feasibility of the pig business.

Objective

The purpose of this study was to investigate the effects of breed types, slaughter weight and sex considering meat quantity and nutritional aspects.

Methods

Animals. Eighty animals, 40 from Optimus (Pietran, male x Large White, female) and 40 from Maximus (Pietran, male x Large White, female - better gene assurance) were used in this study. Within these two genotypes, the animals were distributed in a balance way in four groups of 10 according to their weight and sex.

Meat quantity. Carcass characteristics evaluated included chilled carcass weight (kg), loin muscle area (cm^2), fat depth at 10^{th} rib (cm), lean yield (expressed as percentage of boned cuts – shoulder, ham, belly and loin - in relation to the weight of cold carcass), fat and muscle thickness at 15^{th} rib given by the Hennessey Grading System (mm).

Nutritional Evaluation. The cholesterol determination in loin, ham and ribs was carried out taken aliquot samples (5ml) from chloroform/ methanol extract according to the BRAGAGNOLO & RODRIGUES – AMAYA (1992) method.

Statistical evaluation. The results were subjected to analysis of variance and treatments differences were tested with the Tukey test for significance at the 5% level.

Results and Discussion

The statistical results of carcass characteristics are given in Table 1. It has been shown that cold carcass from heavy male, independent from genotype, was heavier than female. As it can be observed, when the carcass weight increased within the sex classes, muscle thickness, fat thickness, loin muscle area and fat depth increased ($p>0.05$) while the lean meat content decreased ($p>0.05$) for heavy male and female from genotype Optimus and Maximus, respectively, probably due to the significant increasing on fat depth. These results corroborated with ARMERO *et al.*, (1999) and ANGERAMI *et al.,* (2002). No significant differences were found between genetic types in carcass lean meat content, which was around 52.3% for Optimus and 54.6% for Maximus. The range in lean meat percentage was 2.3 units, which would affect the returns to the producer. The lean meat percentage for Maximus was quite similar than those reported by GARRIDO *et al.*, (1998) (54.1%) and higher than ANGERAMI *et al.,* (2002), which was close to 50%. OLIVER *et al.,* (1993) and GARRIDO *et al.*, (1998) reported that breeds with good conformation such as Pietran and Belgian Landrace had significantly higher lean meat content than Large White and Duroc.

The cholesterol content was affected by breed type, sex, weight and muscle (Figures 1, 2 and 3). In general Maximus presented lower levels of cholesterol than Optimus, whereas, sex varies in according to the trait considered. So, when the ham is taken into account, heavy female Optimus (49mg/100g) showed higher levels than heavy male (42mg/100g). However, for light animals it is the opposite. Heavy animals, independent from breed type, presented significantly higher levels of cholesterol than light animals. Finally, ribs (61, 59, 56, 65 mg/100g) showed significantly higher levels of cholesterol than loin (54, 49, 59, 45 mg/100g) and ham (41, 33, 36, 47 mg/100g) for both genetic lines evaluated. However, GARCIA et al., (2000) found cholesterol content higher in ham than loin although in a range similar to the present research.

Conclusions

The present study emphasizes the importance and interactions of genetic lines, carcass weight and sex on quantity and nutritional aspect of pig meat. Breed types, slaughter weight and muscle anatomical location effects were more important than sex. The results of this investigation indicated that Maximus has important economical and nutritional advantages to the production meat chain. In this connection the investment applied in breeding has a safety return to the producer since the payment system is based on percentage of lean meat in the carcass. Furthermore, the consumer concerned with health could choose the muscles with less cholesterol content.

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Table 1. Statistical results of carcass characteristics for different genetic types, sex and weight of the pigs.

Characteristics	Optimus				Maximus			
	Male		Female		Male		Female	
	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light
Chilled carcass (kg)	94.8[a]	81.2[b]	90,9[a]	83,9[b]	98.0[a]	76,1[c]	84,7[b]	76,0[c]
Lean meat (%)	50.1[a]	52.9[a]	55.0[a]	51.3[a]	54.7[a]	53.1[a]	53.8[a]	56.9[a]
LMA (cm^2)[1]	48.5[a]	42.7[a]	48.5[a]	47.1[a]	53.7[a]	43.5[ab]	48,3[ab]	42.0[ab]
FD (cm)[2]	3.1[a]	1.7[b]	1.8[b]	1.7[b]	2.7[a]	2.1[ab]	2.4[a]	1.5[b]
FT (mm)[3]	23.0[a]	20.3[a]	20.1[a]	16.3[a]	20.7[a]	20.0[a]	19.3[ab]	14,2[ab]
MT (mm)[3]	67.3[a]	61.9[a]	67.3[a]	55.6[a]	72.2[a]	59.6[b]	68.1[ab]	64,9[ab]

[1]Loin Muscle Area, at 10th rib. [2]Fat Depth, at 10th rib.
[3]Fat and Muscle Thickness – optic probe at 15a rib and inserted at 6 cm from splitted carcass.
[abc] – Means within a row without a common superscript letter differ ($p < 0.05$)

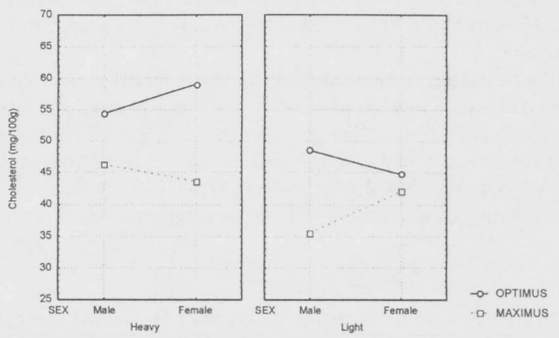

Figure 1. Cholesterol levels in loin from Optimus and Maximus genetics line.

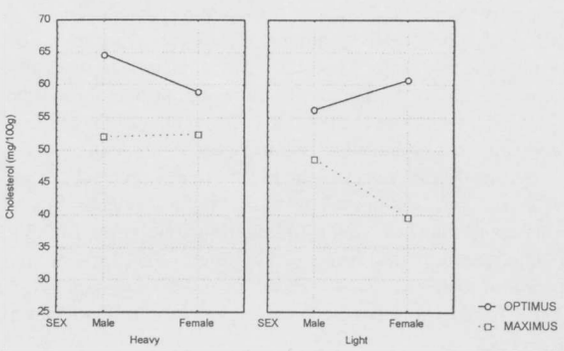

Figure 2. Cholesterol levels in ribs from Optimus and Maximus genetics line.

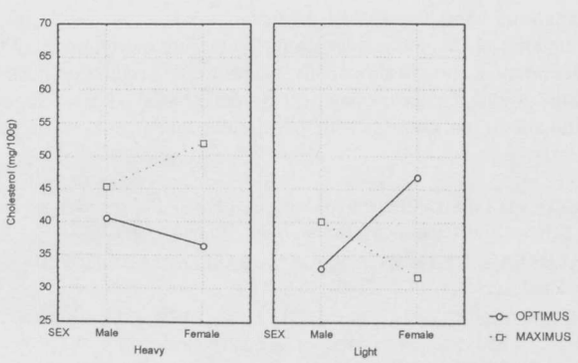

Figure 3. Cholesterol levels in ham from Optimus e Maximus genetics line.