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Effect of strain, sex and age on carcass parameters of broilers

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ABSTRACT. A total of 1,080 one-day-old broiler chicks were used, distributed into a completely randomized design in a 6 x 2 x 4 factorial scheme, with six replications of 30 birds each (15 males and 15 females). Chicks were classified into six breeds (Cobb 500 Slow, Cobb Fast, Ross 308, Ross 508, Hybro Plus and Avian 48), male or female and four slaughter ages (43, 45, 46 and 49 days). Ten birds from each experimental unit (5 males and 5 females) were slaughtered to evaluate carcass yield and commercial cuts. Cobb 500 Slow males showed the maximum potential for weight gain at 47 days old, while the other breeds, between 33 and 35 days old, regardless of sex. Carcass and breast fillet yield showed significant differences, independent of breed, sex and slaughter age, highlighting Cobb breeds. Significant interactions were observed for breast yield, boned and deboned legs among breeds, sex and slaughter age; sex was the determining factor. Wing yield has not been affected by any of the studied factors.

Keywords: breeding, poultry, breast yield, leg yield.

Efeito da linhagem, sexo e idade nos parâmetros de carcaça de frangos de corte

RESUMO. Foram utilizados 1.080 pintos de corte, de um dia de idade distribuídos em um delineamento inteiramente casualizado em esquema fatorial 6 x 2 x 4, com seis repetições de 30 aves cada (15 machos e 15 fêmeas). Foram considerados no estudo, seis linhagens (Cobb 500 Slow, Cobb Fast, Ross 308, Ross 508, Hybro Plus e Avian 48), sexo (machos e fêmeas) e quatro idades de abate (43, 45, 46 e 49 dias de idade). Para avaliação do rendimento de carcaça e dos cortes comerciais foram sacrificadas dez aves por unidade experimental (5 machos e 5 fêmeas). Machos da linhagem Cobb 500 Slow apresentaram potencial máximo de ganho de peso aos 47 dias de idade enquanto que para as demais linhagens, independente do sexo, aos 33 e 35 dias de idade. Os rendimentos de carcaça e do filé de peito apresentaram diferenças significativas independente da linhagem, sexo e idade de abate, com destaque para as linhagens Cobb. Para o rendimento do peito e de pernas com ossos e sem ossos foram observadas interações entre as linhagens, sexo e idade de abate, sendo que o sexo foi o fator determinante. O rendimento de asas não foi afetado por nenhum dos fatores estudados.

Palavras-chave: melhoramento genético, aves, rendimento de peito, rendimento de pernas.

Introduction

Brazil is currently one of the largest producer and exporter of chicken meat worldwide, producing around 10,895 million tons, only behind of the United States and China. In the international market, Brazil stands out as the largest exporter, with around 3.5 million tons of chicken meat exported for more than 145 countries (ABEF, 2010).

The evolution and the competitiveness of world and Brazilian poultry industry are mainly due to the constant pursuit of improving the genetic material. Studies on genetic improvement brought expressive impacts on the production systems for development of breeds compatible to the highly competitive requirements in the productive, industrial and consumer markets.

In this context, poultry industry increasingly has defined the product to be used based on the benefits provided for the whole chain, from reproduction until the post-slaughter processing (GROSSO et al., 2009). As a result, carcass characteristics with emphasis on noble meat yield, such as breast meat, quality attributes, such as taste and color, fat deposition and muscle fiber composition are considered by breeding programs (YANG; JIANG, 2005). Another important aspect is the adjustment to the consumer market in order to meet the demand for processed and easy preparing products.

In spite of the known advances, there are still potentials to optimize the livestock performance and meat yield of the different commercially used breeds.

Experiments carried out with broiler breeds and evaluations of crossovers available in literature show besides the performance benefits, the development of competitive breeds to meet the requirements of the consumer market related to meat quality and yield (BOARETTO, 2009).

In the selection process, breeds were mischaracterized and originated specific pedigrees, with their own characteristics. Despite that, Hoffmann (2005) argues that the genetic base of most commercial breeds is the same and therefore the selection pressure for traits such as performance and carcass yield results in distinct products.

Souza et al. (1994) showed that some breeds have presented a continuous genetic progress in traits of economic interest. In this evaluation, the breeds Ross, Cobb and Hubbard had a higher breast yield than Arbor Acres breed.

In this way, the evaluation of breeds existing in the market should be periodical, once genetic advantages of economic importance, such as breast and leg yield, can change between breeds. The molecular basis incorporated to the selection programs is already being done in order to achieve increasingly faster genetics benefits (BOSCHIERO et al., 2009).

Vieira and Moran Jr. (1998) evaluated the carcass yield of 49-day-old chickens from four different breeds and found no difference in the yield, but differences of up to 20% in the amount of abdominal fat were verified between different commercial breeds.

Flemming et al (1999) compared the yield of the carcass and of parts of five commercial breeds: Ross, Cobb, Hubbard, Arbor Acres and Isa Vedette, and registered differences only between Ross and Cobb from the others, which showed a smaller yield. Comparing Ross with Cobb, the first had the best yield of boneless leg.

On the other hand, in more recent evaluations, Moreira et al. (2003) and Stringhini et al. (2003) verified no difference in the yield of carcass or cuts between Ross and Cobb breeds. In relation to the productive performance, these authors observed that both breeds showed a similar satisfactory performance.

Moro et al (2005) compared the productive performance of Ross and Cobb breeds with two Embrapa breeds and no significant difference was detected at the age of 56 days for any productive parameter.

Another important factor to be considered is that chicken performance and carcass characteristics are mainly influenced by sex, breed and slaughter age (BILGILI et al., 1992). Thus a correct evaluation of

the yield should consider these factors in order to avoid misleading decision-making, which will certainly affect the company profit (MOREIRA et al., 2003).

This study aimed to compare the weight gain of commercial breeds, males and females, and to evaluate the yield of the carcass and cuts of commercial interest in different slaughter ages.

Material and methods

The experiment was conducted in the Experimental Aviary of the *Universidade Federal do Paraná - Campus Palotina*, Palotina, in the state of Paraná, Brazil. All the procedures of animal rearing and collection of biological material were approved by the Ethics Committee on the Use of Animals in Experiments of Federal University of Paraná - *Campus Palotina*, and met the principles of animal experimentation, according to the Brazilian College of Animal Experimentation.

It was used 1080 one-day-old broiler chicks, provided from breeders of the same age and from six different commercial breeds. Eggs of all evaluated breeds were hatched in the same commercial hatchery, located in the Western State of Paraná. The post-hatched chicks were selected, vaccinated and sexed.

Chicks were distributed into a completely randomized design in a factorial scheme 6 x 2 x 4, with six replications of 30 birds each (15 males and 15 females). Six breeds were considered in the study (Cobb 500 Slow, Cobb Fast, Ross 308, Ross 508, Hybro Plus and Avian 48), sex (males and females) and four slaughter ages (43, 45, 46 and 49 days). In order to evaluate the growth curve for the different breeds and sex, it was only considered the age of the birds (7, 14, 21, 28, 35 and 42 days), according to linear regression models. At the housing day, females had their spur cauterized, except for the Cobb Fast females that is not an auto-sexable breed.

The barn used was divided into 36 1.5 x 2.5 m boxes. The temperature was kept in the thermal comfort range by using bellflowers with infrared heating lamps, ventilators, extractor fans and cooling pads with automatic control. It was used wood-chip bedding and birds were submitted to a 24h continuous light program.

Feed and water were supplied *ad libitum* throughout the experimental period. The nutritional program was divided into three phases: initial (1 to 21 days), growth (22 to 37 days) and slaughter (38 to 42 days). These diets, based on corn and soybean, were formulated according to the nutritional values of the foods and the nutritional recommendations adopted by poultry companies of the region.

The weight gain was evaluated weekly throughout the experimental period by weighing females and males of all experimental units separately.

In order to determine the carcass yield, at 43, 45, 46 and 49 days old, ten birds (five males and five females) were randomly separated per experimental unit totaling 30 males and 30 females per treatment. Birds were identified, weighed and fasted for 6h. After the recommended fasting period, birds were taken to slaughter and to evaluate the parameters related to the carcass yield. To calculate the carcass yield, it was considered the hot eviscerated carcass weight, without feet, head and abdominal fat, in relation to the live weight. For the yield of cuts, it was considered the total boneless and skinless breast yield, the breast muscle *pectoralis minor* (breast fillet), legs with skin and bone, legs with skin and without bone, and wings, which was calculated in relation to the eviscerated carcass.

Data were analyzed using SAS software package (GLM procedure) (SAS, 1998). For the analysis of variance, assumption of normality was previously checked. The variable factors showed a normal distribution, allowing performing a parametric procedure of analysis of variance. The interaction between breed, sex and age, when significant, was unfolded according to the involved factors. The breed effect was evaluated by a multiple comparisons of means (Tukey), the sex effect by using an analysis of variance (F test), and the age effect by using regression analysis. Models were selected by the adjusted coefficient of determination (adjust-R^2); by the significance of regression and the lack of adjustment (tested by F test); by the significance of regression coefficients (tested by F test). The maximum and minimum points of the quadratic and cubic models were estimated by derivation of the adjusted coefficient of the regression. For all statistics procedures the significance level was set at 5%.

Results and discussion

The variation of the weight gain obtained weekly from the commercial breeds, males and females, is presented in Figures 1, 2 and 3. The growth curve of Cobb Fast breed is not shown, because this breed is not auto-sexable. Except for males from Cobb 500 Slow, the other breeds presented a cubic behavior independently from the sex (p < 0.01). On the other hand, the weight gain of Cobb 500 Slow males presented a quadratic effect (p < 0.01). This result

indicates that Cobb 500 Slow males have a greater growth potential, which can lead to a longer time in the aviary. According to the adjusted equation, the Cobb 500 Slow males can be more efficiently explored if kept in the aviary until 47 days old (Figure 1). The maximum growth potential for the other breeds, independently from the sex, was between 33 and 35 days.
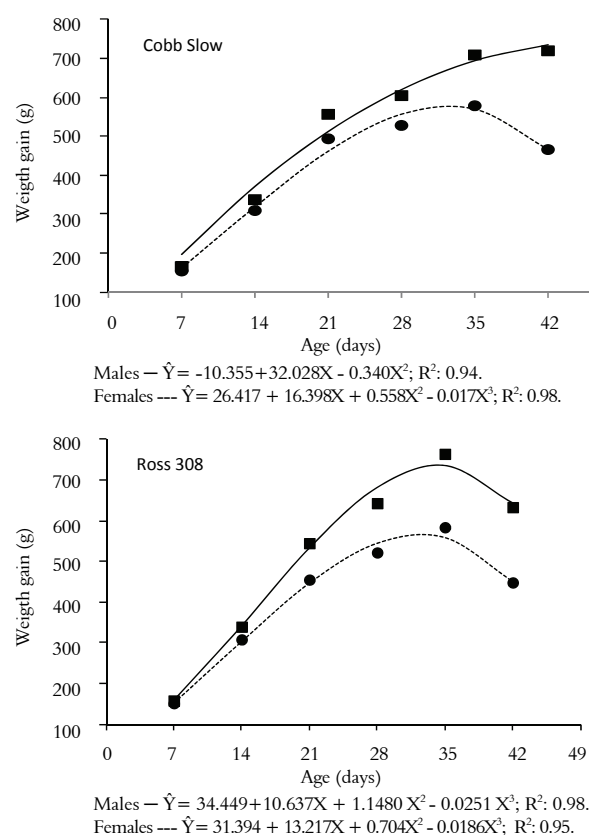

Males — $\hat{Y} = -10.355 + 32.028X - 0.340X^2$; R^2: 0.94.
Females --- $\hat{Y} = 26.417 + 16.398X + 0.558X^2 - 0.017X^3$; R^2: 0.98.

Males — $\hat{Y} = 34.449 + 10.637X + 1.1480 X^2 - 0.0251X^3$; R^2: 0.98.
Females --- $\hat{Y} = 31.394 + 13.217X + 0.704X^2 - 0.0186X^3$; R^2: 0.95.

Figure 1. Growth curve of Cobb Slow and Ross 308 from 1 to 42 days old.

Marcato et al. (2009) found similar growth rates for Cobb and Ross breeds, both presented the inflection point of the growth curve at 35 days old.

With advancing age, the growth rate decreases, with lower daily weight gain. The turning point in a curve, namely the inflection point of the curve corresponds to the time that the bird reaches its highest growth rate and thus the rate starts to lower down (REDDISH; LILBURN, 2004). In this way, growth curves of a certain breed may assist in the establishment of specific food program and to define the optimum slaughter age.

The Table 1 lists the results of carcass yield of male and female broilers with 43, 45, 46 and 49 days old from different commercial breeds.
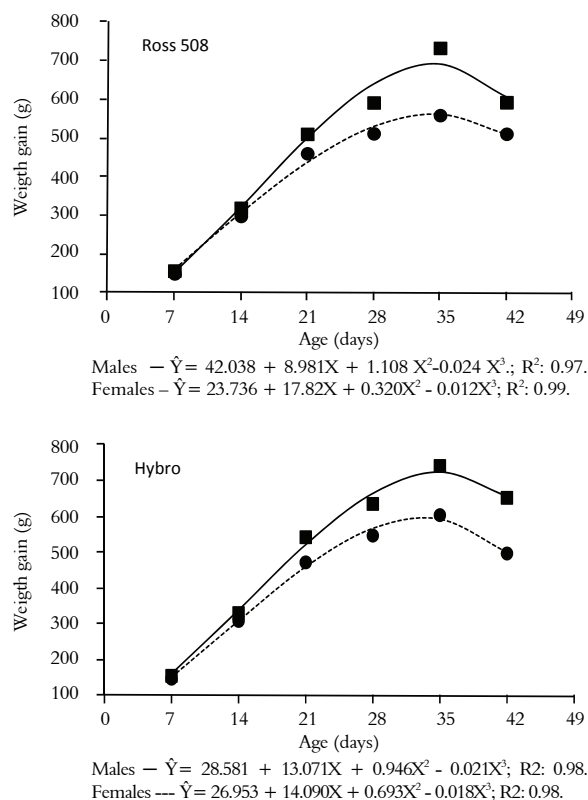
Males — $\hat{Y}= 42.038 + 8.981X + 1.108\ X^2 - 0.024\ X^3$; R^2: 0.97.
Females – $\hat{Y}= 23.736 + 17.82X + 0.320X^2 - 0.012X^3$; R^2: 0.99.

Males — $\hat{Y}= 28.581 + 13.071X + 0.946X^2 - 0.021X^3$; R^2: 0.98.
Females --- $\hat{Y}= 26.953 + 14.090X + 0.693X^2 - 0.018X^3$; R^2: 0.98.

Figure 2. Growth curve of Ross 508 and Hybro from 1 to 42 days old.

No significant interaction (p > 0.05) was detected for live weight in relation to breed, sex and slaughter age, but a significant effect was observed within each evaluated factor. Among breeds, there

was a significant difference (p < 0.05), in which Hybro broilers were superior in relation to Cobb Fast and Avian 48, without differences from other breeds (Table 1).
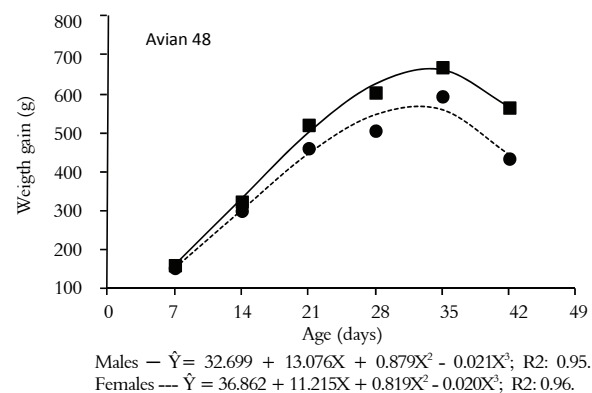

Males — $\hat{Y}= 32.699 + 13.076X + 0.879X^2 - 0.021X^3$; R2: 0.95.
Females --- $\hat{Y}= 36.862 + 11.215X + 0.819X^2 - 0.020X^3$; R2: 0.96.

Figure 3. Growth curve of Avian 48 from 1 to 42 days old.

Considering the carcass yield, no significant interaction was found between the factors (p > 0.05). There was a significant difference (p < 0.05) between breeds, regardless of the sex (Table 1). Ross 508 chickens presented a superior carcass yield in relation to the other breeds, excepted for Ross 308. The slaughter age, also independently from sex and breed, influenced the carcass yield in a quadratic way (p < 0.05). According to the equation, broilers slaughtered at 47.8 days old presented a greater carcass yield.

Table 1. Live and carcass weight (grams) and relationship (%) between carcass and cut weight from different broiler strains.

	Live Weight (g)	Carcass (%)	Breast (%)	Breast Fillet (%)	Bone Leg (%)	Boneless Leg (%)	Wings
Strain							
Cobb slow	3172.07[ab]	71.58[b]	24.19	5.52	33.39	27.48	10.89
Cobb fast	3148.33[b]	72.02[b]	23.44	5.52	33.90	27.65	10.58
Ross 308	3139.52[b]	72.14[ab]	22.89	5.49	31.84	26.27	10.75
Ross 508	3169.18[ab]	72.97[a]	22.63	5.43	32.94	27.19	10.67
Hybro	3242.54[a]	71.62[b]	21.69	5.37	33.97	27.83	11.15
Avian 48	3157.86[b]	72.06[b]	22.92	5.56	33.92	27.88	10.81
Sex							
Male	3501.47[a]	71.98	23.03	5.26[b]	33.60	27.33	10.74
Female	2859.44[b]	72.15	23.01	5.69[a]	32.98	27.36	10.85
Slaughter							
43 days	2876.26	71.25	23.00	5.37	32.06	26.42	10.99
45 days	3112.85	71.74	23.07	5.44	33.49	27.43	10.78
46 days	3246.11	72.74	22.83	5.49	33.57	27.66	10.54
49 days	3463.04	72.49	23.20	5.65	33.98	27.80	10.95
CV (%)							
ANOVA							
Strain	p < 0,01	p < 0.05	p < 0.01	NS	p < 0.01	p < 0.01	NS
Sex	p < 0.01	NS	NS	p < 0.01	p < 0.01	NS	NS
Slaughter	Linear[1]	Quadratic[2]	NS	Linear[3]	Linear	Linear	NS
Interactions							
Strain x Sex	NS	NS	p < 0.05	NS	p < 0.05	p < 0.05	NS
Strain x Slaughter	NS	NS	p < 0.01	NS	p < 0.01	p < 0.01	NS
Slaughter x Sex	NS	NS	NS	NS	p < 0.01	p < 0.01	NS
Strain x Sex x Slaughter	NS	NS	NS	NS	p < 0.01	NS	NS

Means followed by different letters in the column differ by Tukey's test, NS = non-significant; [1]$\hat{Y}= -1295.10 + 99.77X$ R^2: 0.97; [2]$\hat{Y}= -71.96 + 6.04X – 0.0632X4749X^2$ R^2:0.60; [3]$\hat{Y}= 3.312 + 0.04749X$ R^2: 0.99.

Males presented a greater (p < 0.05) live weight. The slaughter age had an increasing linear effect independently of sex and breed.

Stringhini et al. (2003) did not observe differences on yield carcass or cuts between breeds. Likewise, Moreira et al. (2003) did not find significant differences on the carcass yield when breeds selected for conformation were slaughtered at 42 or 49 days old, neither for males or females.

The breast yield was affected by the significant interaction (p < 0.05) between breed x sex and breed x slaughter age (Table 1). The results by unfolding these interactions are shown in the Table 2. The choice for the breed with the best breast yield depends on the sex. Cobb Slow males and Cobb and Ross females presented higher breast yield. This result has economic impact on companies that commercialize breast and its respective cuts.

Table 2. Unfolding of interactions strain x sex and strain x slaughter age for breast yield (%) of males and females from different broiler strains.

	Cobb slow	Cobb fast	Ross 308	Ross 508	Hybro	Avian 48	Effect
Sex							
Male	24.76[a]	23.00[bc]	22.56[bc]	22.40[bc]	21.92[c]	23.41[b]	p < 0.05
Female	23.72[a]	23.90[a]	23.19[ab]	22.83[ab]	21.48[c]	22.36[bc]	p < 0.05
Slaughter							
43 days	24.71[a]	23.44[ab]	23.02[bc]	21.54[cd]	20.46[d]	22.01[bc]	p < 0.05
45 days	23.97[a]	24.16[a]	23.21[a]	23.04[a]	20.94[b]	22.91[a]	p < 0.05
46 days	23.47[a]	22.74[a]	22.86[a]	22.65[a]	22.45[a]	22.98[a]	NS
49 days	24.36[a]	23.33[ab]	22.26[b]	22.93[ab]	22.58[ab]	23.33[ab]	p < 0.05
Effect	NS	NS	NS	NS	[1]linear	NS	

Means followed by different letters in the row differ by Tukey's test, NS = non-significant; [1]$\hat{Y}= 4.2525 + 0.3896X$; R^2: 0.71.

The choice of the best slaughter age for yield breast depends on the breed. In general, in the slaughter at 43 days old a better yield was registered for Cobb breeds. On the other hand, when broilers are slaughtered at the age of 49 days, all breeds presented a similar yield, with significant difference only between Cobb Slow and Ross 308 and Hybro, in which the last two had an inferior breast yield.

The unfolding of slaughter age and breeds showed that only the breast yield of Hybro breed increases over the slaughter age. The agro-industry that exclusively works with this breed has potential to improve this characteristic if extending its rearing period, independently from the sex. The processing industry can have a particular interest in this breed, once the breast cut is one of the most expensive and valued component of the carcass. Longer breasts and more uniform in muscle thickness are more suitable to the new culinary requirements, because of its better yield in specific cuts, reducing meat leftovers.

In accordance to these results, Coneglian et al. (2010) concluded that Cobb breed, considered as having a rapid initial growth, was superior to Ross, which shows slower initial growth rate and carcass and cuts yield.

The breast fillet yield was only influenced by sex and slaughter age (Table 1). Females presented a higher yield of this cut. The yield of breast fillet increased linearly along the slaughter age, similar to observed for live weight at slaughtering ages.

In relation to the yield of legs with bone, a triple significant interaction (p < 0.05) was found between breed, sex and slaughter age (Table 1). The Table 3 presents the results of the unfolded interactions.

To Cobb Slow and Fast, Hybro and Avian males, slaughter age had no influence (p < 0.05) on the yield of legs with bone. For Ross 308 and 508 breeds, it was observed a quadratic effect and according to the equations, the maximum yield percentage of legs with bone was obtained at the age of 47 days. Regarding the slaughter age, at the age of 43 days, Hybro, Cobb Fast and Avian 48 breeds were superior, Cobb Slow breed was intermediary, and Ross breeds had the lowest yield. Slaughtering at 45, 46 or 49 days old did not change the yield of this characteristic among males of the tested breeds.

Table 3. Unfolding of interactions strain x sex x slaughter age for the yield of legs with bones of males and females from different broiler strains.

	Cobb slow	Cobb fast	Ross 308	Ross 508	Hybro	Avian	Effect
			Males				
43 days	32.37[b]	34.14[ab]	25.64[d]	29.03[c]	35.27[a]	33.52[ab]	p < 0.05
45 days	34.53[a]	33.77[a]	34.93[a]	33.53[a]	35.08[a]	35.13[a]	NS
46 days	34.41[a]	34.75[a]	32.72[a]	34.29[a]	33.72[a]	35.60[a]	NS
49 days	34.25[a]	35.17[a]	35.05[a]	33.38[a]	34.93[a]	34.14[a]	NS
Effect	NS	NS	[1]quadratic	[2]quadratic	NS	NS	
			Females				
43 days	32.66[a]	35.08[a]	31.24[a]	35.01[a]	32.86[a]	32.28[a]	NS
45 days	32.59[a]	32.80[a]	32.28[a]	31.98[a]	33.19[a]	32.91[a]	NS
46 days	33.44[a]	32.51[a]	32.78[a]	33.14[a]	32.86[a]	33.69[a]	NS
49 days	33.94[a]	34.48[a]	33.67a	32.60a	34.52a	32.31[a]	NS
Effect	NS	NS	[3]linear	NS	NS	[4]quadratic	

Means followed by different letters in the row differ by Tukey's test, NS = non-significant; [1]$\hat{Y}= -1029.7379+44.8719X - 0.472527X^2$ R^2: 0.85; [2]$\hat{Y}= -751.3501+33.4562X - 0.3559X^2$ R^2: 0.99; [3]$\hat{Y}= 13.7375+0.4102X$ R^2: 0.97 [4]$\hat{Y}= -262.8853 + 12.853X - 0.139343X^2$ R^2: 0.85.

To Cobb, Ross 508 and Hybro females, slaughter age did not influence (p > 0.05) the yield of legs with bone. For Ross 308 and Avian 48 breeds, it was observed a linear and quadratic effect, respectively. Ross 308 females presented a greater percentage of yield of legs with bone with advancing age. According to the quadratic equation, the maximum yield percentage of legs with bone to Avian 48 breed was obtained at the age of 46 days. In relation to slaughter age of females, no significant effect was observed for any of the evaluated breeds.

The analysis of the yield of boneless legs with skin revealed a significant interaction (p < 0.05) between breed and sex, breed and slaughter age and sex and slaughter age (Table 1). In the Tables 4 and 5 the results of the unfolding of interactions are shown.

Table 4. Unfolding of interactions line x sex and strain x slaughter age for the yield of boneless legs of males and females from different broiler strains.

	Cobb slow	Cobb fast	Ross 308	Ross 508	Hybro	Avian 48	Effect
Sex							
Male	27.18[a]	28.00[a]	25.44[b]	27.09[a]	28.19[a]	28.24[a]	p < 0.05
Female	27.74[a]	27.28[a]	26.97[a]	27.29[a]	27.50[a]	27.46[a]	NS
Slaughter							
43 days	26.91[a]	27.72[a]	23.78[b]	26.53[a]	27.91[a]	27.27[a]	p < 0.05
45 days	27.47[ab]	27.28[ab]	27.05[b]	27.00[b]	27.85[a]	28.32[a]	p < 0.05
46 days	27.68[a]	27.69[a]	27.17[a]	27.74[a]	27.37[a]	28.31[a]	NS
49 days	27.93[a]	28.1[a]	28.24[a]	27.14[a]	28.28[a]	27.26[a]	NS
Effect	NS	NS	[1]quadratic	NS	NS	NS	

Means followed by different letters in the row differ by Tukey's test; NS = non-significant; [1]$\hat{Y}= -357.3507 + 16.0159X - 0.166292X^2$ R²: 0.98.

Ross 308 males showed a lower yield of boneless legs with skin (p < 0.05) compared with the other breeds, but females had no significant difference (p > 0.05) for this parameter. In relation to the breeds as a function of slaughter age, there was a quadratic behavior (p > 0.05) only for the Ross 308. According to the equation, this breed presented a better yield at the age of 48 days, whereas the other breeds showed a similar yield independently from the slaughter age.

Independently from sex, comparing the slaughter age, at 43 days old, the lowest yield of boneless legs with skin was presented by Ross 308. At 45 days, Avian 48 was superior only to Ross breed. The others presented a similar yield. In the other slaughter ages, there was no remarkable difference in the yield of boneless leg with skin between the breeds.

Comparing males and females according to the slaughter age (Table 5), a quadratic behavior was verified for boneless legs with skin only for males. The maximum yield for this characteristic was obtained at 47 days. Females presented a similar behavior (p > 0.05) independently from slaughter age.

Table 5. Unfolding of interactions sex x slaughter age for the yield of boneless legs of males and females from different broiler strains.

	Slaughter Age				
	43 days	45 days	46 days	49 days	Effect
Sex					
Male	25.69[B]	27.87	27.97	27.83	[1]quadratic
Female	27.31[aA]	27.02[a]	27.43[a]	27.76[a]	NS
Effect	p < 0.05	NS	NS	NS	

Means followed by different lowercase letters in the row differ by Tukey's test; Means followed by different capital letters in the column differ by Tukey's test, NS = non-significant; [1]$\hat{Y}= -315.6637 + 14.6053 - 0.1555018X^2$ R²: 0.98.

The results relative to the yield of boneless or boned legs show that the most influent factor is the sex. Males should be slaughtered later for a better yield, while female flocks, considering only boneless legs with skin, should be slaughtered with 43 days old. Agro-industry working with sexed flocks interested in this characteristic should perform distinct slaughter programs for males and females.

On the other hand, within each slaughter age, males and females were different only at 43 days old for this characteristic, when females were superior (Table 5).

In previous studies, Mendes et al. (1993), Souza et al. (1994) and Stringhini et al. (2003) verified that the weight and the percentage of thigh + drumstick were higher in males at the age of about 42 days. On the other hand, it was observed that near this age the yield of boneless or boned legs of males, independently from the breed, was lower than of females.

Wing yield was not influenced (p > 0.05) by any of the studied factors. The evolution on the performance and in carcass characteristics of broiler breeds has been more pronounced in recent decades, and resulted in significant genetic gains and, therefore, in differences among current commercial breeds according to the selection process they were submitted to (SCHMIDT et al., 1999). Moreover the tendency with the progress in breeding programs on broilers is that the interaction between genotype and environment become more and more important, aiming selection, management and nutrition of breeds for more specific market objectives.

Current commercial breeds for conformation characteristics have shown competitiveness, reaching a balance between meat yield and performance. Nevertheless, the decision of "what is the best breed" should be based on the genetic package that results in better profitability, showing a balance among the different sectors of the productive chain. The effect of the selection of a given commercial breed must be evaluated on the breeder-broiler set, the final segments of the meat productive chain.

The balance between a good productivity of the breeder and the commercial product, the live chicken or the products obtained at the slaughtering is very

important. It is not profitable to have a high performance breeder and a bad commercial product or vice-versa. The ideal is to balance production of eggs and chicks with chicken rates matching viability, feed conversion and weight gain, and also the yield of the most expensive cuts, mainly breast and legs, since these products are well paid at the market.

Conclusion

Cobb 500 Slow males presented the maximum weight gain at 47 days old, while for the other breeds, independently from the sex, it was between 33 and 35 days old.

Yield of carcass and breast fillet presented significant differences regardless of breed, sex and slaughter age. For breast and legs yield it was observed a significant interaction between breed, sex and slaughter age. Considering the breast yield, Cobb breeds were highlighted, and as for the leg yield, sex was the determinant factor.

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