







The effect of four commercial broiler hybrids and the season on occurrence of broiler condemnations in the abattoirs

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ABSTRACT: Condemnations in the broilers abattoirs can represent an overview farms health and effectiveness of welfare programs, as well as predisposition between hybrids. The aim of this study was to investigate the prevalence of condemnation among four commercial broiler hybrids and the oscillation of condemnations in different seasons in a poultry abattoir. Data from condemnations of the Federal Inspection Service of a slaughterhouse were analyzed during one year, in which a total of 12.81% of partial condemnations were observed and total condemnations represented 0.41% of slaughtered broiler. There was a difference in total and partial condemnation among the hybrids evaluated, with Hubbard hybrid being the one with the highest number of condemnations (0.67% - 17.71%), followed by Ross 95 (0.42% - 14.21%), Cobb (0.30% - 10.03%); and Cobb Fast (0.26% - 9.29%). The analysis between the seasons showed a higher conviction rate in winter and a lower rate in autumn for both total and partial condemnation. Hubbard had the highest rates and Cobb Fast the lowest for most causes of condemnation. We concluded that the metabolic cause led to higher losses by total condemnation, while contamination or technopathies represented the highest rates in partial losses. The broiler hybrid and the time of year may influence the causes of condemnation in the abattoir. This information should be considered by the abattoir and the farms in sanitary planning, considering the financial impact due to losses by condemnations of carcasses.

Key words: animal health, condemnation, disease, prevention, quality control.

O efeito de quatro linhagens comerciais de frangos de corte e a estação do ano na ocorrência de condenações no abatedouro

RESUMO: As condenações no abatedouro de frangos podem representar uma visão geral da saúde das granjas e da eficácia dos programas de bem-estar, bem como revelar diferenças fenotípicas entre linhagens. O objetivo deste estudo foi investigar a prevalência de condenação entre quatro híbridos comerciais de frangos de corte e a oscilação de condenações em diferentes épocas em um frigorífico de aves. Os dados das condenações do Serviço Federal de Inspeção de um abatedouro foram analisados durante um ano, no qual foram observadas 12,81% de condenações parciais e 0,41% de condenações totais. Houve diferença na condenação total e parcial entre os híbridos avaliados, sendo o híbrido Hubbard o com maior número de condenações (0,67% - 17,71%), seguido por Ross 95 (0,42% - 14,21%), Cobb (0,30%) - 10,03%; e Cobb Fast (0,26% - 9,29%). A análise entre as estações do ano demonstrou uma maior taxa de condenação no inverno e menor taxa no outono para condenação total e parcial. Hubbard apresentou as maiores taxas e Cobb Fast as mais baixas para a maioria das causas de condenações. Concluímos que a causa metabólica resultou em mais perdas por condenação total, enquanto a contaminação ou tecnopatias representaram as maiores taxas em perdas parciais. A linhagem de frango de corte e a época do ano podem influenciar nas causas de condenação no abatedouro. Essas informações devem ser consideradas pela indústria e pelas granjas no planejamento sanitário, considerando o impacto financeiro devido às perdas por condenações de carcaças.

Palavras-chave: condenação, controle de qualidade, doenças, prevenção, sanidade animal.

INTRODUCTION

According to data from the *Brazilian Animal Protein Association* (ABPA, 2018), in 2017 the Brazil occupied the 2nd place in the world poultry meat production, behind only the United States of

America. However, Brazil remains in first place in world exports, destining more than 30% of chicken meat production to exportation. Following the legal recommendations of the *Ministry of Agriculture, Livestock, and Supply*, through the supervision of the Federal Inspection Service, a considerable fraction

of chicken carcasses are condemned in Brazilian abattoirs (FERREIRA et al., 2012). Therefore, the inspection service acts strictly in order to ensure the commercialization of safe products to public health (MAPA, 2016).

Condemnation of carcass can be classified as pathological, when it has an etiological agent; and non-pathological, when resulting from traumatic injuries occurred during loading, transport and hanging or by poor calibration of slaughter equipment (LUDTKE et al., 2010). The three main causes of condemnations are sanitary, management and industrial operation (MENDES & KOMIYAMA, 2011; BOYSEN et al., 2016). Thus, it can be argued that abattoir condemnations may serve as an indicator of the health of the chicken lots in a region, the functionality of the equipment in the industry, and the effectiveness of the animal welfare programs used, which impacts on the profitability of abattoir and producers by increasing total or partial carcass losses.

The evaluation of different broiler hybrids is fundamental to obtain updated data about the productive characteristics that best meet the needs of the consumer market (MOREIRA et al., 2003). In addition, knowing the time of year with the highest occurrence of condemnations in a region with a subtropical climate and its causes, would make prevention more effective. Therefore, the aim of this study was to identify the prevalence of condemnations between four broilers hybrids and the occurrence of condemnations regarding the season.

MATERIALS AND METHODS

The broilers come from 130 different farms, in a total of 326 aviaries, all destined for a single abattoir. The lots had varying sizes depending on the size of the poultry farm. However, the density was the same for all lots, following industry regulations (16 birds/meter²). The poultry farms were negative pressure (Exhaust Fan), with nebulizers and side closure of blue curtains, standardized luminosity for the life span. Nutrients that made up the broiler chicken feed were the same for all farms (confidential data not provided by the company).

Catching of broilers on the farm for transportation was carried out by six catching teams, carrying 2 birds by the back simultaneously. The transport to the abattoir was carried out with 8 broilers per box. The distances from the farms to the abattoir were within a radius of 28 km. Poultry picking started at 2 a.m., when the birds were calmer and the temperature was mild. The recommended

fasting time was 6 to 12 hours, and the waiting time was less than 2 hours in an environment with fans and nebulizers. In the abattoir, unloading was carried out in a fully automated and death occurs from bleeding after electrical water-bath stunning.

The condemnations data were obtained from the Federal Inspection Service records of a poultry slaughterhouse in western Paraná - Brazil, with an average slaughter of 160,000 broilers/day, in the period from April 1, 2015 to March 31, 2016. Data about the total and partial condemnations, condemnations by hybrid broiler and between the seasons were collected. All slaughtered lots were of mixed breeding (without sexing), the average slaughter weight of the broilers was 2.8 kg and the average age was 46 ± 2 days.

The condemnations followed the recommendations of the Federal Inspection Service, being considered total (the whole broiler and its viscera are discarded) in cases of extensive alterations in the carcass, such as ascites, colibacillosis, cachexia, disgusting aspect, hemorrhagic syndrome, salpingitis, septicemia, inadequate bleeding, neoplasia, delayed gutting, excessive scalding, myopathy, dermatosis, multiple bruises/fractures, extensive fecal or biliary contamination, cellulitis, arthritis, aerosaculitis and abscesses. Partial condemnations (only the affected portion of the broiler is discarded) were performed when there was a localized damage from fecal or biliary contamination, cellulitis, bruises/fractures, dermatosis, callus on feet, aerosaculitis, arthritis, colibacillosis, myopathy, salpingitis, ascites syndrome and excessive scalding (BRASIL, 1952; BRASIL, 1998). Weight data of each hybrid and in each season were also analyzed.

The occurrence of season-related condemnations was verified by collecting data separately in the summer months (December 21st to March 19th), autumn (March 20th to June 19th), winter (June 20th to September 21st), spring (September 22nd to December 20th), for each hybrid individually, as well as disregarding the hybrid factor.

The total condemnation date, partial condemnation and weight date between seasons and between hybrids were submitted to statistical analysis of variance (ANOVA) and the means, when significant, were compared by the Tukey test at 5%, using the IBM SPSS Statistics 23 software.

RESULTS AND DISCUSSION

The total slaughtered broilers of the evaluated hybrids were 41,673,798. Considering the

hybrid line distribution was as follows: Cobb hybrid, 903 lots (26,650,509 broilers); Cobb Fast, 485 lots (10,050,337 broilers); Ross 95, 200 lots (4,030,845 broilers); and Hubbard, 56 lots (1,129,951 broilers). Of the total broilers slaughtered in the evaluated period, 0.41% had total condemnations (170,862 broilers) and 12.80% had partial condemnations (5,334,246 broilers). Main causes of total condemnations were ascites (30%), colibacillosis (21%), cachexia (17%), disgusting appearance (14%), and others (18%), while main causes of partial condemnations was fecal contamination (30%), biliary contamination (16%), cellulitis (17%), contusion/fractures (16%), dermatosis (11%), arthritis (5%), aerosaculitis (2%) and others (3%) without distinction between hybrids.

Considering the total carcass condemnations between hybrids, Cobb Fast presented the lowest condemnation rate, similar to Cobb, followed by Ross 95. Hubbard hybrid had the highest condemnation rate (Table 1). Regarding the seasons, without distinction of hybrid it was observed that in autumn there was a lower occurrence of all causes of total condemnation, followed by spring. The highest

rates of condemnations occurred in summer and winter, being similar (Table 2).

Ascites represents one of the main causes of condemnations in the abattoir (MASCHIO & RASZL, 2012; BELINTANI et al., 2019). This pathological condition is characterized by accumulation of fluid in the abdominal cavity produced by general causes of edema (BAGHBANZADEH & DECUYPERE, 2008), which is a progression of ascites syndrome. Improvements in practices of nutrition, management, health and genetic improvement raise mortality problems and condemnation for metabolic disorders, such as ascites, and it is observed that birds resistant to this pathology imply impairment in zootechnical development (ROSÁRIO et al., 2004). According to BAGHBANZADEH & DECUYPERE (2008), losses are more pronounced in lots of broilers subjected to conditions such as poor ventilation, cold, stress and rapid growth with a good initial performance. Thus, it was possible to relate the hybrid that had the lowest occurrence of ascites syndrome and ascites to the lowest average weight throughout the year (Table 3), which in the present study was the Cobb Fast hybrid (Table 1). Therefore, this was the hybrid with less

Table 1 - Total and partial condemnations among four commercial broiler hybrids (Cobb, Cobb Fast, Ross 95 and Hubbard) during a one-year period in an abattoir (Paraná, Brazil).

Causes of total condemnations	Hybrids			
	Cobb Fast	Cobb	Ross 95	Hubbard
Disgusting appearance %	0.04 ± 0.04 ^a	0.05 ± 0.06 ^b	0.08 ± 0.06 ^c	0.05 ± 0.06 ^c
Colibacillosis %	0.05 ± 0.18 ^a	0.06 ± 0.14 ^a	0.09 ± 0.20 ^b	0.17 ± 0.18 ^c
Ascites %	0.08 ± 0.07 ^a	0.10 ± 0.08 ^b	0.14 ± 0.14 ^c	0.21 ± 0.13 ^d
Cachexia %	0.05 ± 0.08 ^a	0.06 ± 0.07 ^a	0.07 ± 0.07 ^b	0.12 ± 0.13 ^c
Others %	0.04 ± 0.11	0.04 ± 0.18	0.06 ± 0.19	0.08 ± 0.18
Causes of partial condemnations	Cobb Fast	Cobb	Ross 95	Hubbard
Foot callus %	0.08 ± 0.13 ^a	0.08 ± 0.13 ^a	0.16 ± 0.46 ^b	0.07 ± 0.11 ^b
Aerosaculitis %	0.27 ± 0.39 ^a	0.29 ± 0.49 ^a	0.36 ± 0.46 ^a	0.92 ± 1.22 ^b
Arthritis %	0.47 ± 0.47 ^a	0.51 ± 0.52 ^a	0.76 ± 0.80 ^b	0.53 ± 0.66 ^a
Cellulitis %	1.11 ± 0.85 ^a	1.34 ± 1.14 ^b	2.18 ± 1.90 ^c	4.20 ± 3.09 ^d
Biliary contamination %	1.78 ± 0.48 ^a	1.85 ± 0.56 ^a	2.38 ± 0.91 ^b	1.89 ± 0.62 ^b
Fecal contamination %	2.56 ± 1.25 ^a	2.82 ± 1.30 ^b	4.63 ± 2.60 ^c	5.35 ± 2.97 ^d
Contusion/fractures %	1.96 ± 0.55 ^a	1.93 ± 0.54 ^a	2.08 ± 0.58 ^b	2.19 ± 0.74 ^b
Colibacillosis %	0.02 ± 0.05 ^a	0.02 ± 0.05 ^{ab}	0.02 ± 0.06 ^{ab}	0.03 ± 0.04 ^b
Dermatosis %	0.80 ± 0.43 ^a	0.95 ± 0.58 ^b	1.81 ± 1.32 ^c	2.33 ± 1.29 ^d
Myopathy %	0.19 ± 0.15 ^a	0.19 ± 0.15 ^a	0.04 ± 0.06 ^b	0.04 ± 0.04 ^b
Excessive scalding %	0.02 ± 0.11	0.02 ± 0.19	0.02 ± 0.09	0.06 ± 0.22
Salpingitis %	0.01 ± 0.03	0.01 ± 0.03	0.01 ± 0.03	0.02 ± 0.02
Ascites syndrome %	0.05 ± 0.04 ^a	0.06 ± 0.05 ^b	0.06 ± 0.06 ^b	0.07 ± 0.07 ^b
Others	0.00 ± 0.03	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00

^aMeans of different letters on the same line are significantly different to hybrids in Tukey's test (P<0.05).

propensity to ascites, in contrast it did not show a high performance. The highest rate of ascites was observed in the Hubbard hybrid, followed by the Ross 95 and Cobb hybrid ($P < 0.05$). However, the average weight was slightly higher for Ross 95 throughout the year. Therefore, animal genetics can contribute to the occurrence, since nutrition and management are the same for all hybrids.

Avian colibacillosis is an infectious disease caused by *Escherichia coli*, the clinical manifestation of the disease may vary in chronic respiratory disease, salpingitis, peritonitis, swollen head syndrome, cellulitis, among others (GROSS, 1994); this disease can be fatal and zoonotic (GAO et al., 2018). Depending on the extent of the lesions, this disease causes partial or total condemnation of the carcass. The Cobb Fast and Cobb hybrids showed higher colibacillosis rates in winter and spring; while Ross 95 and Hubbard hybrids in the summer. In the Hubbard hybrid, colibacillosis occurred in higher proportions with more condemnations throughout the year, while Cobb and Cobb Fast presented a low rate of condemnations ($P < 0.05$). Salpingitis is also caused by *E. coli* and the rates of occurrence between

hybrids and seasons were similar to those observed for colibacillosis ($P > 0.05$) (Table 1 and Table 2).

Cachexia was the third leading cause of total carcass condemnation in the present study. According to MENDES & KOMIYAMA (2011), cachexia is related to chick quality and with inadequacies in the initial management, temperature, health, water and feed intake, and nutrition; also, may be related with the stocking rate in the aviary and an inadequate weight gain from various causes in the first weeks of life. Cobb Fast and Cobb had a lower condemnation rate compared to Ross 95 and Hubbard ($P < 0.05$) (Table 1), with lower incidence in the autumn compared to other seasons ($P < 0.05$) (Table 2), associated with increase in the average weight (Table 3).

The carcass with disgusting appearance is that of poor appearance, abnormal coloring or that exhales odors of medicines, excremental, sexual or other odors considered abnormal (BRASIL, 1952). This cause of condemnation was more reported in the Ross 95 and Hubbard hybrid and less in Cobb Fast and Cobb ($P < 0.05$); while between seasons, it was observed a lower occurrence in the autumn and

Table 2 - Total and partial condemnations (%) without distinction of broiler hybrids verified for season of the year in a poultry slaughterhouse of Paraná during one year.

Causes of total condemnations	Summer	Autumn	Winter	Spring
Disgusting appearance %	0.07 ± 0.07 ^c	0.04 ± 0.04 ^a	0.05 ± 0.05 ^b	0.06 ± 0.07 ^c
Colibacillosis %	0.06 ± 0.14 ^{ab}	0.04 ± 0.10 ^a	0.08 ± 0.15 ^b	0.07 ± 0.20 ^b
Ascites %	0.07 ± 0.08 ^a	0.09 ± 0.07 ^b	0.14 ± 0.12 ^c	0.09 ± 0.08 ^b
Cachexia %	0.07 ± 0.08 ^b	0.04 ± 0.05 ^a	0.07 ± 0.09 ^b	0.06 ± 0.07 ^b
Others %	0.06 ± 0.24 ^b	0.03 ± 0.08 ^a	0.05 ± 0.19 ^{ab}	0.04 ± 0.11 ^{ab}
Causes of partial condemnations	Summer	Autumn	Winter	Spring
Foot callus %	0.08 ± 0.19 ^a	0.07 ± 0.12 ^a	0.10 ± 0.26 ^{ab}	0.11 ± 0.16 ^b
Aerosaculitis %	0.23 ± 0.33 ^a	0.22 ± 0.43 ^a	0.45 ± 0.66 ^c	0.33 ± 0.52 ^b
Arthritis %	0.85 ± 0.69 ^c	0.48 ± 0.55 ^b	0.33 ± 0.36 ^a	0.45 ± 0.42 ^b
Cellulitis %	1.16 ± 1.12 ^a	1.05 ± 0.09 ^a	3.05 ± 1.74 ^c	1.48 ± 1.35 ^b
Biliary contamination %	1.70 ± 0.46 ^a	1.84 ± 0.55 ^b	2.22 ± 0.78 ^c	1.80 ± 0.48 ^b
Fecal contamination %	2.94 ± 1.37 ^b	2.42 ± 1.19 ^a	3.43 ± 1.86 ^c	3.18 ± 1.99 ^{bc}
Contusion/fractures %	2.05 ± 0.06 ^c	1.84 ± 0.05 ^a	1.95 ± 0.05 ^b	1.98 ± 0.05 ^{bc}
Colibacillosis %	0.01 ± 0.05 ^a	0.01 ± 0.02 ^a	0.02 ± 0.06 ^b	0.02 ± 0.06 ^{ab}
Dermatosis %	0.85 ± 0.62 ^a	0.88 ± 0.45 ^a	1.46 ± 1.09 ^b	0.95 ± 0.57 ^a
Myopathy %	0.16 ± 0.16 ^a	0.19 ± 0.14 ^b	0.20 ± 0.16 ^b	0.14 ± 0.11 ^a
Excessive scalding %	0.03 ± 0.30	0.02 ± 0.09	0.02 ± 0.13	0.01 ± 0.05
Salpingitis %	0.01 ± 0.03 ^a	0.01 ± 0.01 ^a	0.02 ± 0.03 ^b	0.02 ± 0.03 ^b
Ascites syndrome %	0.04 ± 0.03 ^a	0.06 ± 0.04 ^b	0.07 ± 0.06 ^c	0.06 ± 0.06 ^b
Others	0.00 ± 0.00	0.00 ± 0.02	0.00 ± 0.00	0.00 ± 0.02

*Means of different letters on the same line are significantly different to seasons in Tukey's test ($P < 0.05$).

Table 3 - Differences between the average weight (kg) of broiler chickens of four commercial hybrids between the seasons.

Hybrids	Average weight and standard deviation by season (kg)				
	Summer	Autumn	Winter	Spring	Average by hybrids
Hubbard	2.99 ± 0.22	2.94 ± 0.09	2.95 ± 0.16	2.93 ± 0.17	2.95 ± 0.16 ^A
Ross 95	2.97 ± 0.16	3.08 ± 0.14	3.02 ± 0.20	2.97 ± 0.15	3.00 ± 0.17 ^A
Cobb	2.87 ± 0.17	2.92 ± 0.14	2.90 ± 0.16	2.83 ± 0.15	2.88 ± 0.16 ^B
Cobb Fast	2.83 ± 0.14	2.90 ± 0.14	2.89 ± 0.16	2.83 ± 0.15	2.86 ± 0.15 ^B
AW + SD _{by season}	2.87 ± 0.17 ^b	2.92 ± 0.15 ^a	2.91 ± 0.17 ^a	2.85 ± 0.16 ^b	2.89 ± 0.16

SD, standard deviation; AW, average weight. ^{*}Means of different letters in the same column are significantly different to hybrids in Tukey's test (P<0.05). Means of different letters on the same line are significantly different to seasons in Tukey's test (P<0.05).

a higher in spring and summer, for most hybrids (P<0.05) (Table 2).

When analyzed the partial condemnations among the hybrids, there is a similarity to the total condemnations. In general, a lower occurrence of partial condemnations was observed in the Cobb Fast and Cobb hybrids, followed by Ross 95 and Hubbard. Exceptions were found for callus on the feet, arthritis and myopathy (Table 1). Condemnation rate differences among seasons are presented in Table 2. They were higher in the winter and lower in the autumn.

Contamination means the presence of intestinal, alimentary or biliary contents internally or externally in the eviscerated carcass. Contaminations are considered technopathies, once it occurs due to failures during the slaughtering process, either due to improper maintenance of the equipment or the processing of lots with uneven sizes on the slaughter line (BOYSEN et al., 2016). In addition, it may result from improper fasting, for example, eighteen hours of fasting cause intestinal weakness, which results in the rupture of the intestine and the contamination of the carcass (MENDES & KOMIYAMA, 2011) and endangering food safety (BOYSEN et al., 2016). The Hubbard and Ross 95 hybrids had the highest condemnations rates compared to the others (P<0.05), it may have occurred due to the unevenness of these lots, despite the higher average weights (Table 3). Excessive scalding is also considered a technopathy and may be related to the disparity in the lots and difficulty in scalding temperature adjustment.

The high density or disparity in the lots may predispose to lumbar scratch dermatosis, which may lead to the occurrence of cellulitis as a result of subcutaneous infections, with *E. coli* being the predominant pathogen (MENDES & KOMIYAMA,

2011). The causes of cellulite are commonly related to high rearing density, lack of feathering, problems with bedding, environmental factors or stress (GARCIA et al., 2002). Late feathering may be related to hybrid genetics, leading to differences between them in the occurrence of cellulite (MENDES & KOMIYAMA, 2011). Thus, the occurrence of dermatosis and cellulite had the same behavior between seasons, being higher in winter (P<0.05) for all evaluated broiler hybrids, possibly due to the agitation of the chickens in order to warm up. However, there was a higher occurrence of these injuries in Hubbard hybrid during all seasons, followed by Ross 95 hybrid, Cobb and Cobb Fast (P<0.05) (Table 1 and Table 2), which can be genetically justified by the late feathering or the agitated temperament of the chickens. Weight does not seem to be a factor that justifies the occurrence of cellulite; although, Hubbard and Ross 95 have higher weight compared to Cobb and Cobb Fast (Table 1 and Table 3).

Condemnations due to contusion and/or fracture may be associated with failures in the poultry breeding, transport or during unloading and hanging (MASCHIO & RASZL, 2012), besides the technopathies resulting from the poor regulation of the industry equipment, mainly in the plucking. For these variables, we observed a higher rate of losses in Hubbard and Ross 95 compared to Cobb Fast and Cobb (P<0.05) (Table 1). In addition, autumn showed a lower rate, while in the summer it was higher (Table 2). Therefore, it is suggested that three factors may be involved: higher thermal stress and wing debating in summer; the genetic predisposition of the hybrids more tranquil during the management (Cobb Fast and Cobb) (MURPHY & WOOD-GUSH, 1978) and weight, due to the higher occurrence of trauma in chickens with high

weight (Hubbard and Ross 95 hybrids), either by articular and bone fragility to human or machine contact (LANGKABEL et al., 2015).

Arthritis can be caused by various viral (avian reovirus) or bacterial (*E. coli* and others) agents present on the farm (BRAGA et al., 2016; PALOMINO-TAPIA et al., 2018). Chickens with arthritis may have lameness, swelling of the tibiotarsal, radial, humeral and ulnar joints and locomotor problems that prevent them from reaching feeding troughs, causing a great impact due to reduced consumption and welfare (CORDEIRO et al., 2012). In general, the Ross 95 hybrid had the highest occurrence of arthritis and the other hybrid the lowest (Table 1). For all hybrids the occurrence was higher in the summer, intermediary in the spring and autumn and lower in the winter ($P<0.05$). It is suggested that the weight or the accelerated growth rate of the hybrids may have influence, due to greater articular fragility.

Aerosaculitis is caused by *Mycoplasma gallisepticum* and the clinical manifestation of this disease includes cough, ocular and nasal discharge, increased feed conversion, unequal lots and variable mortality (NASCIMENTO & PEREIRA, 2009). Temperature, ventilation, humidity and dust are risk factors for respiratory diseases (KLEVEN, 1998). In the present study, winter had higher rates of condemnations for aerosaculitis in all evaluated hybrids ($P<0.05$). Among the broiler hybrids, Hubbard presented more cases of aerosaculitis, while the others presented less condemnation (Table 1). Cachexia rates agree with the findings, since the disparity of the lot may lead to total condemnation.

Myopathy of the deep pectoral muscle has been known for decades, while broiler breast muscle abnormalities such as spaghetti meat, white striping and wooden breast conditions have been reported for the last 10 years (PETRACCI & CAVANI, 2012; MAIORANO, 2017). Improvements in the growth rate, feed efficiency and performance introduced abnormalities in muscle quality, especially in the pectoral muscle (GRIFFIN et al., 2018). In addition, the high-energy diets for lower feed conversion are increasing the incidence of striae or white striping on the breast and thighs of chickens as well as higher body weight (PETRACCI & CAVANI, 2012). For all hybrids, the occurrence of myopathy was lower in the spring and summer and had higher in autumn and winter ($P<0.05$) (Table 2). Among the hybrids, Cobb and Cobb Fast were the most affected and differed from Ross 95 and Hubbard ($P<0.05$), possibly related to food and genetic

efficiency. The increase in myopathies seems to coincide with the increase in weight for Cobb and Cobb Fast (Table 2 and Table 3).

The foot callus is characterized by superficial to deep necrotic and inflammatory lesions of the plantar surface of the paws and toes, is also known as pododermatitis or contact dermatitis (SHEPHERD & FAIRCHILD, 2010). Some of the factors involved in the higher or lower callus occurrence are management, nutrition, body weight, genetics and sex (SHEPHERD & FAIRCHILD, 2010; MARTINS et al., 2016). Thus, higher feed intake and excrement volume results in increased litter moisture, which is harmful (MARTINS et al., 2016). There was a higher occurrence of callus on the feet for the Ross 95 hybrid ($P<0.05$); in relation to the seasons, in spring the occurrence was higher and was lower in summer and autumn ($P<0.05$), and in this case weight was not a determining factor (Table 3). Because it is mixed breeding in all lots and equal nutrition, we believed that hybrid and feed conversion may be related to the higher occurrence of calluses.

Lastly, it was observed that dermatosis, cellulite and bruises/fractures (LUDTKE et al., 2010) and foot callus (SARAIVA et al., 2016) may indicate possible failures of broiler welfare, either in the management of the breeding (high density, stress and quality of the litter) or pre-slaughter (picking, loading, transport and hanging). To the author's knowledge, this is the first study to analyze condemnation's rates between strains and between seasons, data that will be important to inspire other research, technicians and industries in the country.

CONCLUSION

The metabolic cause was the main cause of total condemnation, while contamination, cellulite and fractures and/or bruises were important in partial condemnation. It is possible to reduce these condemnations by the adoption of peaceful management practices of poultry, from farms to the abattoir. In addition, is also important to adjust the abattoir equipment considering the weight of the lots. Condemnations between broiler hybrids must be carefully analyzed, opting for those with the less financial loss to the producer and the slaughterhouse, considering the yield per kg of weight. Improving hybrids performance can result in an increase in some causes of condemnations. They varied according to the seasons and this information help the abattoirs or predict changes or adjustments to the inspection team when the demand is higher.

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DECLARATION OF CONFLICT OF INTERESTS

The authors declare no conflict of interest. The founding sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

AUTHORS' CONTRIBUTIONS

All authors contributed equally to the manuscript.

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