

Influence of age on post-slaughter traits of Star 53 HY ducks

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Slaughter value in poultry is the effect of the interplay between many factors which, in the most general terms, can be divided into genetic and environmental. Genetic factors (bird species, breed, line, use type) significantly affect slaughter value. Live weight and slaughter traits of ducks and nutritional value of meat and its technological traits crucially depend on the origin of these birds (Farhat & Chavez, 2000; Mazanowski et al., 2001, 2003; Kokoszyński & Korytkowska, 2005; Górski & Górka, 2006; Kokoszyński, 2009). Waterfowl, including ducks, are characterized by a lower dressing percentage (mean from 61% to 65%) compared with burrowing poultry, especially turkeys (Gornowicz & Dziadek, 2001; Janocha et al., 2003; Mazanowski & Bernacki, 2004; Jankowski, 2012; Mikulski et al., 2012)

However, many authors characterize ducks as fast growing birds with good dressing percentage indices and good musculature (Retailleau, 1999; Kisiel, 2001; Biesiada-Drzazga et al., 2011). Proportions between different parts of the body and percentage content of different internal organs in the total body weight change with age (Murawska et al.). Usually older birds show a better slaughter value than younger ones, which is manifested by a higher dressing percentage and better chemical composition of meat. The aim of the present study was to determine the effect of age on post-slaughter traits of Pekin-type ducks.

Material and methods

The study was performed on crossbred

meat-type Pekin Star 53 HY ducks of French origin. Day-old sexed ducklings were purchased from the Poultry Hatchery in Międzyrzec Podlaski. Experiments were conducted on 75 ducks and 75 drakes. Rearing period was 8 weeks. The birds were raised indoor in the intensive farming system as broilers in conditions congruent with commonly used technology.

Table 1 present nutritional value of complete concentrated feed mixtures offered to birds throughout the study period. Three types of complete diets differing in nutritional value were used (during 1 d – 3 wk, 4–5 wk and 6–8 wk). The contents of components in every used diet were determined in the laboratory of the Department of Animal Nutrition and Feed Management of the Faculty of Natural Sciences, Siedlce University of Natural Sciences and Humanities according to AOAC (2000). Feed was available *ad libitum*.

Body weight of ducks was monitored throughout the rearing period. Day-old ducklings were individually labeled with plastic tags on the left wing, weighed in subgroups, and then since 7 d of age, birds were individually weighed at weekly intervals. At each measurement date (weeks of rearing) 5 birds were chosen from each subgroup for slaughter. A total of 40 ducks and 40 drakes were slaughtered. Birds for slaughter were selected after individual weighing and arranging them in ascending order according to the body weight. Therefore, at each measurement date, every 8th – 10th bird was picked up from the above series.

Table 1. Chemical composition of feed mixtures

Item	Mixtures – Rearing period (weeks)		
	I	II	III
	0–3	4–6	7–8
Dry matter (%)	91.87	92.05	91.86
Crude protein (%)	22.10	19.66	17.31
Crude fibre (%)	3.96	4.67	5.31
Fat (%)	3.85	2.62	2.57
Ash (%)	5.71	5.00	4.63
Calcium (%)	0.95	0.90	0.88
Available phosphorus (%)	0.71	0.61	0.50
Me _n (kcal/kg)	2935	2988	2960S

After slaughter, exsanguination and defeathering of birds, slaughter analysis was carried out according to the method developed by Ziółcecki & Doruchowski (1989). The head, feet, inedible viscera (reproductive system, digestive tract without gizzard, respiratory and urinary system), giblets (heart, liver, gizzard) and neck were excised and weighed on an electronic balance. Slaughterhouse offal comprised: blood, feathers, head and feet. Dressing percentage was calculated based on pre-slaughter body weight and eviscerated carcass weight. The obtained results were subjected to statistical analysis (Statistica, version 10.0).

Results and discussion

Table 2 presents mean body weights of ducks and drakes during rearing period. Sex-related differences in body weight were observed even from 1 wk of age. From 4 wk till the end of rearing, drakes were characterized by a significantly higher body weight compared with ducks (the differences were confirmed at $P \leq 0.01$). At the end of rearing, i.e. at 8 wk of age, mean body weight of ducks was 3290 and drakes 3670, while the overall mean body weight in the group was 3480 g. The magnitude of standard deviation of the mean body weight indicates low variability of this trait in the study subgroups.

Body weight obtained in the present study is slightly lower than results obtained by Kokoszyński (2011) in Star 53 HY ducks where body weight of 7 weeks old ducks was 3177, and drakes 3482 g, while of 8 weeks old ducks 3374

g and 3772 g, respectively. According to „Instruction of Pekin duck breeding” by Grimaund Freres Selection (2005) company, the mean body weight of Star 53 HY ducks of commercial flock should reach 206 g at 8 d, 187 g at 28 d, 3500 g at 49 d, and 3800 g at 56 d.

Murawska et al. (2008) reported that the mean body weight of P55 ducks at 7 wk was 3321.3 g while in other studies of the same author (Murawska et al., 2010) Pekin ducks fed *ad libitum* standard diets reached body weight of 3314 g at 7 wk of age. Also studies on Pekin ducks conducted by Farhat & Chavez (2000) and Retailleau (1999) demonstrated that body weight of these birds exceeded 3400 g at 7 wk. On the other hand, in the studies of Adamski & Bernacki (2002), body weight of 8 weeks old ducks of A55 line was 2824 g

The weight of slaughterhouse offal (Tab. 2) between 1 wk and 5 wk increased from 47 to 468 g in drakes and from 36 to 330 g in ducks, i.e. more than 10 times. The differences proved significant beginning from 5 wk and highly significant in older birds. The slaughterhouse offal weights differed statistically significantly between sexes.

In the studies by Murawska et al. (2010), weight of inedible components in 7 weeks old Pekin ducks was 1347 g at the mean body weight of 3314 (blood, feathers, head, feet, gastrointestinal tract with contents and periintestinal fat, trachea, lungs, kidney and abdominal fat) which amounted to 40.6% of body weight of ducks.

Table 2. Mean values and standard deviation of body weight and slaughterhouse offal in ducks (g)

Weeks	Body weight			Slaughterhouse offal		
	♂	♀	♂ and ♀	♂	♀	♂ and ♀
1	220±3.7	195±11.5	208±4.9	47±2.7	36±7.1	42±3.9
2	630±21.9 a	500±21.1 b	565±20.9	128±21.0	100±17.3	114±18.0
3	1270±231.1 a	1050±119.2 b	1160±213.4	260±21.7	246±21.2	253±22.1
4	1860±212.1 A	1600±111.2 B	1730±213.5	346±31.0	369±34.7	358±33.2
5	2580±210.4 A	2060±112.8 B	2320±176.5	465±32.1 a	382±21.9 b	424±31.1
6	3130±213.9 A	2760±187.5 B	2945±197.3	462±32.9 A	360±11.9 B	411±27.8
7	3410±210.6 A	3100±176.9 B	3255±203.2	447±34.8 A	350±31.9 B	399±34.0
8	3670±276.9 A	3290±155.6 B	3480±231.5	468±28.9 A	330±11.2 B	399±23.8

A, B – significant differences between sexes for a given age at $P \leq 0.01$.
a, b – significant differences between sexes for a given age at $P \leq 0.05$.

Table 3. Mean values and standard deviation of inedible viscera and giblets weight in ducks (g)

Weeks	Inedible viscera			Giblets		
	♂	♀	♂ and ♀	♂	♀	♂ and ♀
1	31±0.8	34±2.5	32±1.2	31±4.1	28±4.0	30±3.9
2	132±19.8 a	108±11.1 b	120±14.2	44±2.9	38±3.8	41±2.9
3	236±21.9 a	195±21.8 b	216±19.7	59±2.9	51±7.8	55±5.1
4	326±10.9 A	270±11.1 B	298±11.2	102±8.9 a	72±1.8 b	87±7.8
5	408±28.9 A	307±34.7 B	358±29.7	154±31.1 a	109±12.0 b	132±27.3
6	410±45.4	405±34.9	408±41.9	180±23.5 a	143±13.1 b	162±22.0
7	379±23.8	379±34.9	379±29.3	200±21.3 a	164±23.7 b	182±21.5
8	372±11.9	372±31.7	357±23.1	215±31.9	203±25.5	209±30.7

A, B – significant differences between sexes for a given age at $P \leq 0.01$.
a, b – significant differences between sexes for a given age at $P \leq 0.05$.

In subsequent weeks, weight of inedible viscera rose with increasing body weight of ducks. Inedible viscera weight averaged 32 g in 1 week old ducks, 298 g at 4 wk, 357 at 8 wk, i.e. it

increased over 14 times. Giblets weight (heart, liver, gizzard) rose from ca. 30 g at 1 wk of age to 209 g on average, i.e. it increased more than 7 times (Tab. 3).

Table 4. Mean values and standard deviation of heart, gizzard and liver weight in ducks (g)

Weeks	Heart			Gizzard			Liver		
	♂	♀	♂ and ♀	♂	♀	♂ and ♀	♂	♀	♂ and ♀
1	2.4±1.0	2.1±0.7	2.3±1.0	11.7±0.8	10.3±0.3	11.0±0.5	16.9±2.3	15.9±0.9	16.4±2.1
2	3.4±0.9	2.9±0.1	3.1±0.4	16.8±1.7 a	14.5±1.0 b	15.7±1.5	23.9±3.1 a	20.5±2.3 b	22.2±2.7
3	4.8±0.9	3.8±0.8	4.3±0.7	24.5±2.1 a	19.7±0.6 b	22.1±0.7	29.6±4.0	27.3±3.9	28.5±4.3
4	7.1±1.5	6.4±1.8	6.8±1.7	44.9±3.7 A	27.5±3.1 B	36.2±2.9	50.2±5.0 A	37.8±3.1 B	44.0±4.8
5	13.5±4.4	12.2±1.8	12.9±3.1	75.9±4.9 A	49.4±1.7 B	62.7±3.3	64.3±4.1 A	47.1±2.3 B	55.7±5.0
6	22.0±1.8 A	17.0±1.9 B	19.5±1.8	82.4±4.2 A	57.1±1.1 B	69.8±3.2	75.7±5.1	69.3±6.1	72.5±6.3
7	24.8±3.0 a	21.5±2.7 b	23.2±2.9	91.1±7.1 A	69.7±3.3 B	80.4±7.0	84.3±4.9 a	72.5±8.1 b	78.4±5.9
8	25.8±2.1	24.2±1.8	25.0±2.0	99.3±5.2 a	89.9±4.9 b	95.6±5.9	90.1±7.3	88.7±7.0	89.4±4.5

A, B – significant differences between sexes for a given age at $P \leq 0.01$.

a, b – significant differences between sexes for a given age at $P \leq 0.05$.

Between 1 wk and 8 wk of age, heart weight (Tab. 4) increased from 2.3 to 25.0 g, liver weight from 16.4 to 89.4 g, gizzard weight from 11.0 to 95.6 g, respectively. Ducks showed lower weight of the heart, liver and gizzard than drakes. Based of the obtained results, it can be noted that during rearing the mean heart weight rose over 11 times, gizzard weight almost 8 times and liver weight slightly more than 4 times. Therefore, it occurred that off all giblets, liver weight rose the least compared with the heart or gizzard of these birds. Kokoszyński (2011) reported that in 8 weeks old Star 53 HY ducks, liver weight was 94 g in drakes and 76 g in ducks, gizzard weight was 94 g and 60 g, respectively and heart weight was 19 and 17 g, respectively.

Tab. 5 presents mean percentage contents of inedible viscera, slaughterhouse offal and giblets. In spite of gradual increase in inedible viscera weight in the following weeks of birds' age, percentage content of inedible viscera in the total body weight systematically decreased from 4 wk. At 8 wk of age, the mean percentage content of inedible viscera was 10.7 % and was similar in ducks and drakes.

Like in the case of inedible viscera, the content of slaughterhouse offal in the body weight of birds was observed to distinctly decrease both in ducks and drakes. The highest percentage content of slaughterhouse offal was noted at 3 and 4 wk of age in ducks and at 2 and 3 wk in drakes. From 6 wk drakes had a greater percentage content of slaughterhouse offal in the body weight compared with ducks (Tab. 5).

At 1 wk of age, giblets accounted for 14.3% of the body weight of birds. A distinct reduction in this component was observed already at 2 wk of age. There was no statistically significant effect of sex on percentage content of giblets in the body weight of birds though it was slightly greater in drakes (Tab. 5). In spite of a marked increase in the body weight of birds and in inedible viscera, slaughterhouse offal and giblet weight, percentage content of these components in the body weight significantly decreased with age. In the studies by Murawska et al. (2008), the percentage content of giblets in P55 ducks decreased with age from 10.27% at 1 wk to 4.75% at 10 wk. It was also observed that percentage content of the heart and liver rose with age while that of the liver was reduced.

Table 5. Proportion (%) of slaughterhouse offal, inedible viscera and giblets in ducks' body weight

Weeks	Slaughterhouse offal			Inedible viscera			Giblets		
	♂	♀	♂ and ♀	♂	♀	♂ and ♀	♂	♀	♂ and ♀
1	21.1±2.2 a	18.1±1.6 b	19.6±1.5	14.8±2.3	17.2±3.1	16.0±3.0	14.1±2.1	14.5±1.9	14.3±2.1
2	20.3±3.7	20.0±2.6	20.2±3.3	21.0±2.8	21.5±1.7	21.2±1.9	7.0±0.3	7.6±0.7	7.3±0.6
3	20.5±2.1 a	23.4±3.1 b	22.0±3.0	18.6±1.9	18.6±1.7	18.6±1.7	4.6±0.3	4.8±1.1	4.7±0.3
4	18.2±3.0 B	23.0±1.7 A	20.8±3.0	17.5±2.5	16.9±1.9	17.2±1.8	5.5±0.4	4.9±0.2	5.3±0.4
5	18.0±0.8	18.5±1.8	18.3±1.7	15.8±1.1	14.9±1.7	15.4±1.0	6.0±1.0	5.3±0.4	5.7±0.5
6	14.8±0.7 a	13.0±0.6 b	13.9±0.5	13.1±0.9	14.7±1.2	13.9±1.0	5.8±2.1	5.2±0.2	5.5±2.0
7	13.1±2.0	11.3±0.7	12.2±2.0	11.1±1.2	12.2±0.6	11.7±0.9	5.9±1.2	5.3±1.7	5.6±1.5
8	12.8±3.0	12.0±1.3	12.4±1.9	10.1±0.9	11.3±0.4	10.7±0.5	5.9±2.1	6.2±0.4	6.1±2.0

A, B – significant differences between sexes for a given age at $P \leq 0.01$.

a, b – significant differences between sexes for a given age at $P \leq 0.05$.

In our studies, we observed a constant increase in dressing percentage with age of birds from 50.0–51.3% at 1 wk to 69.8–72.5% at 8 wk of age (Tab. 6). At 7 wk of age dressing percentage averaged 70.6%, and at 8 wk it increased to 71.9. In the first four weeks of life, drakes were characterized by slightly better dressing percentage but later till the end of rearing ducks showed a greater dressing

percentage (differences were statistically significant at 7 and 8 wk). Studies by Biesiada-Drzazga et al. (2011) revealed that 7 weeks old Star 53 HY ducks were characterized by very high dressing percentage averaging 78.4% in drakes and 75.1% in ducks. In the studies by Mazanowski & Bernacki (2004) and Clayton & Powell (1979), dressing percentage of 7 weeks old Pekin ducks ranged from 61.5% to 62.7%.

Table 6. Dressing percentage of ducks

Weeks	Sex		
	♂	♀	♂ and ♀
1	50.7±2.3	50.2±4.8	50.5±4.1
2	51.7±2.6	50.9±11.8	51.3±7.9
3	56.3±3.8 a	53.2±1.9 b	54.8±2.9
4	58.4±2.1 a	55.2±4.8 b	56.8±5.1
5	60.2±4.3	61.3±6.8	60.8±7.0
6	66.4±2.8	67.1±5.2	66.8±4.3
7	69.9±5.1 b	71.2±3.8 a	70.6±4.9
8	71.2±9.8 b	72.5±11.8 a	71.9±10.9

a, b – significant differences between sexes for a given age at $P \leq 0.05$.

The studies of Kokoszyński et al. (2010) revealed that dressing percentage of 8 weeks old Pekin P44 and P55 ducks was lower than in the present studies and amounted to 67.8% and 67.5%, respectively.

Lower values of dressing percentage were also reported by Adamski (2005) in A44 ducks and Mazanowski et al. (2001) in four line crosses of Pekin ducks.

On the other hand, higher values were

obtained by Kokoszyński (2011) who assessed dressing percentage in 8 weeks old ducks of different breeds: 72.5–73.4% in Star HY ducks, 71.7–72.7% in AP54 crosses, 70.8–71.4% in PP54 and 71.1–72.8% in PP45 ducks. Bernacki et al. (2008) evaluated dressing percentage of 7 weeks old Star 63 ducks at 69.4% in drakes and 70.3% in ducks.

In the studies of Murawska et al. (2010) the percentage of carcass in the body weight of P55 ducks increased with age from 49.19 at 1 wk of age to 66.97% at 10 wk.

Conclusions

The present studies demonstrated that in the following weeks of age of Pekin Star 53 HY ducks, the weight of inedible and edible viscera, slaughterhouse offal and giblets distinctly increased with increasing body weight, while percentage content of these components in the body weight of ducks and drakes declined. In addition, it was revealed that dressing percentage increased till 8 wk of age of birds independently of sex. Birds reared till 7 and 8 wk were characterized by high dressing percentage amounting to 70.6% and 71.9%, respectively.

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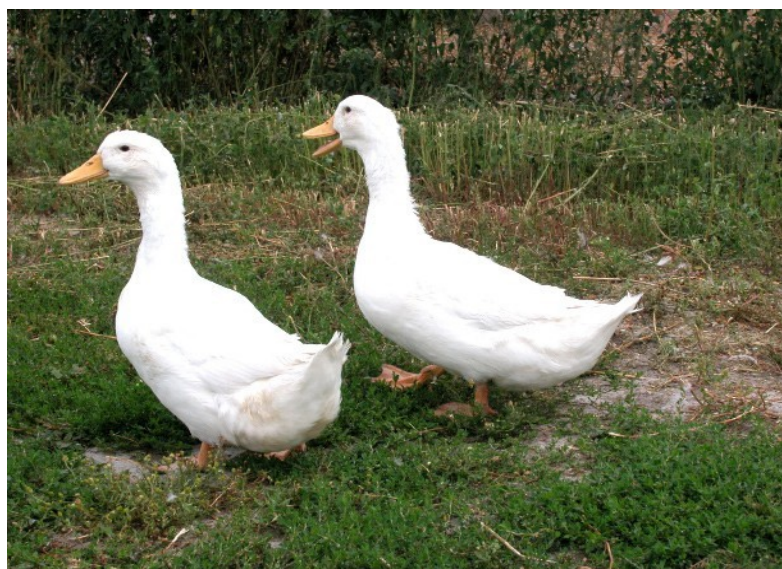
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INFLUENCE OF AGE ON POST-SLAUGHTER TRAITS OF STAR 53 H.Y DUCKS

Summary

The aim of the study was to determine the effect of age on the post-slaughter characteristics of ducks. The experimental material were the meat-type crossbred Pekin ducks – Star 53 HY of French origin. One-day-old ducklings were bought at the hatchery. 75 ducks and 75 drakes, reared intensively up to the age of 8 weeks were examined. The study showed that in subsequent weeks of rearing, there was a marked increase in the body weight, non-edible entrails mass, weight of offal and giblets, while at the same time, the share of the mentioned components in body mass of both ducks and drakes decreased. Furthermore, dressing percentage increased up to 8 weeks of rearing, regardless of sex. At 7 and 8 weeks of age, birds were characterized by high dressing percentage of 70.6 and 71.9%, respectively.

Key words: ducks, age, dressing percentage, post-slaughter characteristics



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