

EFFECT OF DIFFERENT DIETS FED TO A BREEDER FLOCK OF GAME PHEASANTS ON MEAT TRAITS OF THEIR OFFSPRING

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Abstract. The study was carried out with 51 game pheasants derived from parents that were fed during the reproductive period with a commercial feed mixture (25 birds) or feed mixture and whole maize grain (26 birds). Pheasants were kept in a confined facility, without regard to sex, in cages on plastic mesh floor for the first three weeks and in pens on straw later on. During the study, offspring received commercial feed mixtures for pheasants or turkeys. The introduction of whole maize grain in the ration of parent pheasants reduced the body weight of their offspring except at 12 weeks of age. In addition, it caused significant decreases in the length of trunk with neck, lower thigh and shank, and chest circumference in 4-week-old pheasants, and in the length of trunk with neck, trunk and lower thigh in 18-week-old birds. Dressing percentage was high in both groups and exceeded 72%. The proportion of breast muscles was higher in the carcasses of pheasants derived from parents fed a low-protein diet with whole maize grain (31.0 vs. 29.0%). A reverse relationship was found for the proportion of leg muscles in the carcass with neck (23.5 vs. 24.0%). The proportion of skin with subcutaneous fat was similar in both experimental groups (6.4 vs. 6.3%).

Keywords: body weight, dressing percentage, parent stock, pheasant

INTRODUCTION

The effect of feeding diets with different protein and energy contents and sources to broiler breeder flocks on chick quality and survival and performance of broiler chickens (offspring) was investigated by Spratt and Leeson [1987], Lopez and Leeson [1995], Bramwell et al. [1996] and Peebles et al. [1999 a, b, 2002]. Lopez and Leeson [1995] showed that a decrease from 16 to 14% in crude protein content of the diets fed to broiler breeder hens does not adversely affect performance and carcass traits in the offspring. However, a decrease of the dietary protein to 10% reduced the body weight of chicks com-

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pared to the diet with 16% protein. In another experiment, Proudfoot et al. [1985] found no significant effect of feeding diets with 15 or 17% protein to broiler breeder hens on the body weight of broiler chicken aged 23 and 41 days. Meanwhile, Enting et al. [2007] reported a beneficial effect of feeding diets with 11% reduced metabolizable energy concentration to broiler breeder hens on the body weight of day-old chicks and 38-day-old chickens.

However, there are no reports in the available literature concerning the effect of different feeding regimens of laying game pheasants on performance of their offspring. The aim of this study was to determine the effect of feeding a whole maize grain diet with reduced protein content to a breeder flock of game pheasants on their body weight and dimensions, dressing percentage, carcass of their offspring reared to 18 weeks of age.

MATERIAL AND METHODS

The study was carried out at the experimental farm of the Department of Poultry Breeding in Wierzychucinek, which belongs to the University of Technology and Life Sciences in Bydgoszcz. Subjects were 51 day-old game pheasant chicks, which were divided into two experimental groups. The first group comprised 25 birds hatched from eggs of pheasants that received a commercial laying diet for pheasants containing 19.0% crude protein and 11.7 MJ (2800 kcal) ME. The second group included pheasant chicks from parents fed a diet containing 15.76% protein and 12.65 MJ (3000 kcal) ME, which consisted of 40% whole maize grain and 60% commercial laying diet.

All birds were kept in a confined, environmentally controlled facility. Pheasants were kept in cages on plastic mesh floor for the first three weeks and in pens on straw later on. Birds were kept without regard to sex and fed *ad libitum* commercial diets for pheasants or turkeys. Pheasants from both groups were fed a diet containing 26% crude protein and 11.3 MJ (2700 kcal) ME until the end of week 3, a diet containing 22% crude protein and 12.1 MJ (2900 kcal) ME from week 4 to 12, and a diet containing 17% protein and 12.1 (2900 MJ) ME from week 13 to 18. Diets are used in turkey or pheasants nutrition.

Individual body weight of the birds was recorded on day 1 and at 4, 8, 12 and 18 weeks of age. In addition, body measurements were made at 4, 8, 12 and 18 weeks of age. Birds were tape-measured with an accuracy of 1 mm for length of trunk with neck (between the first cervical vertebra and base of tail feathers), length of trunk (between tuberosity of shoulder joint and base of tail feathers), length of keel (from the anterior to the posterior edge), chest circumference (behind wings through anterior edge of the keel and middle thoracic vertebra), length of lower thigh (along the lower thigh bone) and length of shank (between tarsal joint and posterior area of the first toe at its base).

After making the body measurements, 6 males with body weight similar to the mean body weight for males in a given group were chosen at 18 weeks of age. After 12-hour fasting of pheasants selected for dissection, they were slaughtered, defeathered and eviscerated. The carcasses were dissected into breast and leg muscles, neck, wings, skin with subcutaneous fat and carcass remainders according to the method of Ziółcki and Doru-

chowski [1989]. The carcass components were weighed on electronic scales with an accuracy of 0.1 g and their percentage in eviscerated carcass with neck was calculated.

The data were analysed statistically to calculate arithmetic means (\bar{x}) and coefficients of correlation (v) of the analysed traits. Significant differences between the groups in the analysed traits were determined using Student's t -test. Calculations were made with Statistica[®] software [StatSoft 2001].

RESULTS AND DISCUSSION

The mean body weight of game pheasants from both experimental groups increased with age. The highest weight gain was recorded between 9 and 12 weeks of rearing. Birds from parents fed only the commercial diet for pheasants during reproduction were characterized by greater body weight compared to pheasants from parents fed the diet lower in crude protein (15.76%) except 12 weeks of age. Significant differences in body weight between pheasants from the groups compared were found at the beginning of rearing in day-old chicks and at 4 weeks of age (Table 1). Compared to our results, higher body weights of game pheasants aged 4 and 8 weeks were reported by Winnicka [1970] and Torgowski et al. [1990], and similar or higher by Ipek and Dikmen [2007]. At 18 weeks of age, the studied birds had lower body weights than 17-week-old pheasants kept in aviaries [Ricard et al. 1991] and 16-week-old pheasants investigated by Krystianiak and Torgowski [1998]. In a study by Kokoszyński et al. [2008], 18-week-old game pheasants receiving only feed mixtures (control group) or feed mixtures and whole wheat grain from 5 weeks of age (experimental group) had higher body weights (control 1086.5; experimental 1187.3 g) than the birds analysed in the present study.

Daily weight gains varied according to the period of rearing (Table 2). The highest daily weight gains in both groups were found between 9 and 12 weeks of age. Pheasants from parents fed the complete diet had higher daily weight gains in the early period of rearing (one-day to 4 weeks of age) and lower daily weight gains from 5 to 12 weeks. During the last two weeks of evaluation, significantly lower weight gains were found in the offspring from parents fed the complete diet (Table 2). In other studies, highest body weight gains were found between 4 and 8 weeks [Ipek and Dikmen 2007], between 6 and 10 weeks [Ricard et al. 1991] and between 7 and 12 weeks [Sarica and Karaçay 1994].

Analysis of body measurements indicates that at 4 weeks of age, pheasants from parents fed the complete laying diet for pheasants had significantly longer trunk with neck, longer lower thighs and shanks, and greater chest circumference compared to pheasants from parents fed a low-protein diet (Table 3). Birds hatched from eggs obtained from the flock receiving the complete diet also had longer trunk and breastbone (non-significant differences) compared to pheasants from parents fed the diet with maize grain. Growth compensation for body weight and body measurements (non-significant differences) in pheasants from parents fed the low crude protein diet occurred at 12 weeks of rearing. Eighteen-week-old pheasants from parents fed the feed mixture alone had significantly longer trunk with neck, trunk and lower thighs, as well as slightly longer keel and shanks

(non-significantly), and smaller chest circumference (Table 4). In a study by Winnicka [1970], 16-week-old pheasants had shorter keel ($\sigma^{\circ} - 10.30$ cm), greater chest circumference ($\sigma^{\circ} - 28.55$ cm) and longer shanks ($\sigma^{\circ} - 7.81$ cm) compared to birds from both groups analysed in our study.

Table 1. Body weight of game pheasants in rearing period
Tabela 1. Masa ciała bażantów łownych w okresie odchowu

Weeks Tygodnie	Statistical measures Miary statys- tyczne	Diet composition of parent pheasants – body weight, g Skład diety bażantów rodzicielskich – masa ciała, g	
		mixture (M) mieszanka (M)	mixture+corn (M+C) mieszanka+kukurydza (M + K)
One-day-old	\bar{x} v	20.8a 9.1	17.9b 8.6
4	\bar{x} v	171.8a 14.0	147.3b 12.3
8	\bar{x} v	415.4 14.0	395.8 15.7
12	\bar{x} v	754.9 15.3	758.5 13.5
16	\bar{x} v	976.1 17.3	920.0 18.6
18	\bar{x} v	985.4 17.4	985.3 18.9

a, b – means in rows with different letters differ significantly ($P \leq 0.05$).

a, b – średnie w rzędach z różnymi literami różnią się statystycznie istotnie ($P \leq 0,05$).

Table 2. Body weight gains of young game pheasants
Tabela 2. Przyrosty masy ciała młodych bażantów łownych

Diet composition of parent pheasants Skład diety bażantów rodzicielskich	Statistical measures Miary statystyczne	Age in weeks – body weight gain, $g \cdot day^{-1}$ Wiek w tygodniach – przyrosty masy ciała, $g \cdot dobc^{-1}$				
		1–4	5–8	9–12	13–16	17–18
Mixture Mieszanka	\bar{x}	5.6	8.7	12.1	7.9	0.7a
Mixture + corn Mieszanka + kukurydza	\bar{x}	4.8	8.9	12.9	5.8	4.7b

a, b – means in column with different letters differ significantly ($P \leq 0.05$).

a, b – średnie w kolumnie z różnymi literami różnią się statystycznie istotnie ($P \leq 0,05$).

Table 3. Body dimensions of game pheasants

Tabela 3. Wymiary ciała bażantów łownych

Trait Cecha	Statistical measures Miary statys- tyczne	Age in weeks – diet composition of parent pheasants Wiek w tygodniach – skład diety bażantów rodzicielskich					
		4		12		18	
		M	M+C	M	M+C	M	M+C
Trunk with neck length, cm Długość tułowia z szyją, cm	\bar{x} v	14.3a 7.2	13.3b 5.3	27.1 5.1	27.7 5.6	28.3a 5.9	27.1b 5.5
Trunk length, cm Długość tułowia, cm	\bar{x} v	8.9 7.4	8.6 9.1	15.3 3.2	16.2 5.7	18.5a 7.6	16.7b 8.2
Chest circumference, cm Obwód klatki piersiowej, cm	\bar{x} v	13.2a 7.2	12.5b 6.2	26.2 5.6	26.5 5.2	25.9 9.4	27.1 8.2
Breastbone length, cm Długość mostka, cm	\bar{x} v	4.6 8.7	4.4 8.0	9.3 8.8	9.4 6.9	11.1 8.8	10.5 10.4
Lower thigh length, cm Długość podudzia, cm	\bar{x} v	6.6a 6.1	6.2b 6.1	11.4 6.0	11.1 7.1	12.4a 8.9	11.8b 6.1
Shank length, cm Długość skoku, cm	\bar{x} v	4.4a 7.7	4.1b 4.0	6.7 8.6	6.5 8.7	6.8 7.8	6.7 8.0

a, b – means in rows with different letters differ significantly ($P \leq 0.05$).

a, b – średnie w rzędach z różnymi literami różnią się statystycznie istotnie ($P \leq 0,05$).

Table 4. Body weight, dressing percentage and carcass composition of male game pheasants

Tabela 4. Masa ciała, wydajność rzeźna i skład tuszek samców bażantów łownych

Item Wyszczególnienie	Statistical measures Miary statystyczne	Diet composition of parent pheasants Skład diety bażantów rodzicielskich	
		mixture mieszanka	mixture + corn mieszanka + kukurydza
Body weight before slaughter, g Masa ciała przed ubojem, g	\bar{x} v	1085.5 4.7	1172.2 5.5
Carcass weight, g Masa tuszki, g	\bar{x} v	801.4 5.8	854.4 6.1
Dressing percentage, % Wydajność rzeźna, %	\bar{x} v	73.8 6.0	72.9 7.1
Neck, % Szyja, %	\bar{x} v	4.8 4.9	5.0 13.7
Wings, % Skrzydła, %	\bar{x} v	11.7 5.5	11.8 4.9
Breast muscles, % Mięśnie piersiowe, %	\bar{x} v	29.0 11.6	31.0 7.9
Leg muscles, % Mięśnie nóg, %	\bar{x} v	24.0 5.8	23.5 10.7
Skin with subcutaneous fat, % Skóra z tłuszczem podskórnym, %	\bar{x} v	6.4 13.9	6.3 10.8
Remainders of carcass, % Pozostałości tuszki, %	\bar{x} v	24.1 14.3	22.4 5.9

Compared to birds obtained from parents fed the complete diet, male pheasants from parents fed the diet with maize grain were characterized by greater preslaughter weight (1085.5 vs 1172.2 g), carcass weight (801.4 vs 854.4 g) and dressing percentage (73.8 vs 72.9%). Dressing percentage, i.e. the ratio of weight of eviscerated carcass with neck to fasting body weight was high and exceeded 72% in both groups. Lower dressing percentage in 18-week-old males (control 70.6, experimental 70.4%) was reported by Kokoszyński et al. [2008]. The carcasses obtained postmortem from male pheasants derived from parents fed the diet with whole maize grain were characterized by a greater content (%) of breast muscles, neck and wings, and a smaller content of leg muscles, skin with subcutaneous fat and remainders of the carcass. In a study by Adamski and Kuźniacka [2006], 16-week-old males had a higher proportion of breast muscles (30.5%) and a lower proportion of leg muscles (23.1%) compared to 18-week-old pheasants from parents receiving the feed mixture alone. A more recent study [Kokoszyński et al. 2008] found a greater content of breast and leg muscles in the carcasses of 18-week-old pheasants compared to those analysed in our study.

CONCLUSIONS

The body weight of game pheasants from differently fed parents during reproduction levelled off by 18 weeks of rearing. At the age of 18 weeks, pheasants from parents fed the complete diet, compared to those from parents fed the diet with whole maize grain, had greater body measurements (except chest circumference), and significantly longer trunk with neck, trunk and lower thighs. High dressing percentage (>72%) was found for male pheasants from both groups analysed at 18 weeks of age. Different feeding regimens in parent flocks of game pheasants had no significant effect on percentage of breast and leg muscles in the carcasses of male offspring aged 18 weeks.

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WPŁYW ZRÓŻNICOWANEGO ŻYWIENIA STADA REPRODUKCYJNEGO BAŻANTÓW ŁOWNYCH NA CECHY MIĘSNE ICH POTOMSTWA

Streszczenie. Badania przeprowadzono na 51 bażantach łownych pochodzących po rodzicach żywionych w okresie reprodukcji przemysłową mieszanką paszową (25 osobników) lub mieszanką paszową i całym ziarnem kukurydzy (26 osobników). Ptaki utrzymywano w pomieszczeniu zamkniętym, bez podziału na płeć, przez pierwsze trzy tygodnie w skrzyniach na podłodze z plastikowej siatki, a następnie

w kojcach na słomie. W okresie oceny bażanty potomne żywiono przemysłowymi mieszankami paszowymi dla bażantów lub indyków. Wprowadzenie całego ziarna kukurydzy w dawce pokarmowej bażantów rodzicielskich wpłynęło na zmniejszenie masy ciała ich potomstwa, z wyjątkiem 12. tygodnia życia. Ponadto spowodowało istotne zmniejszenie długości: tułowia z szyją, podudzi i skoków oraz obwodu klatki piersiowej u bażantów w wieku 4 tygodni, a u ptaków 18-tygodniowych długości: tułowia z szyją, tułowia i podudzi. Wydajność rzeźna u ptaków obu grup była duża i przekraczała 72%. Procentowy udział mięśni piersiowych był większy w tuszkach bażantów pochodzących po rodzicach karmionych dawką z obniżonym poziomem białka zawierającą całe ziarno kukurydzy (31,0 vs 29,0%). Odwrotną prawidłowość stwierdzono dla udziału mięśni nóg w tuszce z szyją (23,5 vs 24,0%). Udział skóry z tłuszczem podskórnym w obu grupach doświadczalnych był podobny (6,4 vs 6,3%).

Słowa kluczowe: bażant, masa ciała, stado rodzicielskie, wydajność rzeźna

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