

# THE EFFECT OF ADDING WHOLE WHEAT GRAIN TO FEED MIXTURE ON SLAUGHTER YIELD AND CARCASS COMPOSITION IN GAME PHEASANTS WPŁYW DODAWANIA CAŁEGO ZIARNA PSZENICY DO MIESZANKI PASZOWEJ NA WYDAJNOŚĆ RZEŻNĄ I SKŁAD TUSZKI BAŻANTÓW ŁOWNYCH

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## ABSTRACT

The mean body weight of pheasant cocks (1226 g) and hens (946.9 g) receiving feed mixtures was lower than that of birds fed diets with wheat (♂ 1421.4 g, ♀ 953.2 g). The dressing percentage of both sexes pheasants fed wheat grain also (69.9%) was only 0.3% lower than in birds receiving feed mixtures only (70.2%). The carcasses of birds (♂♀) fed the diet with whole wheat grain contained more breast muscles (251.2 g), leg muscles (198.8 g) and other carcass components. The carcass percentage of breast muscles, leg muscles, wings and skin with fat was lower, and that of remainders of carcass higher in pheasants receiving wheat grain. In addition, the carcasses of pheasants (♂♀) fed the wheat diets were characterized by a higher weight of meat and fat and lower carcass meat and fat percentage.

Key words: pheasants, wheat, body weight, slaughter yield, carcass composition

## STRESZCZENIE

Średnia masa ciała kogutów (1226 g) i kur (946,9 g) bażantów żywionych mieszankami paszowymi była mniejsza od ptaków karmionych dietą z udziałem pszenicy (♂ 1421,4 g, ♀ 953,2 g). Wydajność rzeźna bażantów obojga płci karmionych także ziarnem pszenicy (69,9%) była tylko o 0,3% mniejsza niż u ptaków otrzymujących tylko mieszanki paszowe (70,2%). Tuszki ptaków (♂♀) żywionych dietą z całym ziarnem pszenicy zawierały więcej mięśni piersiowych (251,2 g), nóg (198,8 g) i innych składników tuszki. Natomiast procentowa zawartość w tuszce mięśni piersiowych, nóg, skrzydeł, skóry z tłuszczem była mniejsza, a pozostałości tuszki większa u bażantów otrzymujących ziarno pszenicy. Ponadto tuszki bażantów (♂♀) karmionych dietą z pszenicą charakteryzowała większa masa mięsa i tłuszczu, a mniejszy ich procentowy udział w tuszce.

Słowa kluczowe: bażant, pszenica, masa ciała, wydajność rzeźna, skład tuszki

## DETAILED ABSTRACT

Badania przeprowadzono na 80 bażantach łownych, które podzielono na dwie grupy żywieniowe (po 40 sztuk). Do 8. tygodnia życia ptaki przebywały w budynku zamkniętym, a następnie w częściowo zadaszonych wolierach. Ptaki żywiono ad libitum. Do 4. tygodnia życia wszystkie bażanty karmiono tylko mieszanką paszową, a od 5. tygodnia mieszankami (grupa A) lub stosowano dietę zawierającą 70% mieszanki i 30% całego ziarna pszenicy (grupa B). W 18. tygodniu życia ptaki ubito, wypatroszono, tuszki schłodzono i wykonano dysekcję na całych tuszkach. Bażanty (♂♀) żywione dietą z udziałem całego ziarna pszenicy miały większą masę ciała przed ubojem (1187,3 vice 1086,5 g), masę tuszki patroszonej z szyją (829,4 vice 763,0 g), a mniejszą wydajność rzeźną (69,9 vice 70,2%). U kogutów różnice w masie ciała i masie tuszki były statystycznie istotne. Nie stwierdzono statystycznie istotnych różnic pod względem masy i procentowego udziału mięśni piersiowych między grupami. Natomiast masa mięśni nóg i pozostałości tuszki u kogutów i ptaków obojga płci była istotnie większa w grupie bażantów karmionych ziarnem pszenicy. Analiza składu tuszki wykazała statystycznie istotne różnice między grupami żywieniowymi w udziale szyi i skrzydeł w tuszkach kogutów bażantów łownych oraz zawartości (%) pozostałości tuszki kur i ptaków obojga płci. Tuszki bażantów obojga płci miały większą masę mięsa, tłuszczu i kości w grupie z dietą zawierającą całe ziarno pszenicy. Natomiast udział procentowy mięsa i tłuszczu był większy, a kości mniejszy w tuszkach bażantów (♂♀) żywionych tylko mieszankami. Ponadto w tuszkach kogutów karmionych ziarnem pszenicy stwierdzono statystycznie większą masę mięsa i kości, a u kur istotnie mniejszy udział procentowy mięsa a większy kości.

## INTRODUCTION

Partial replacement of feed mixture with whole wheat grain has a positive effect on avian production economics, with varying influence on the value of production traits. Krawczyk et al. [2] showed that broiler chickens which received 70% of the feed mixture and 30% of whole wheat grain from 4 weeks of age were characterized by the poorest production results, although feeding costs decreased considerably (by 9.3%). Sage et al. [6] reported that the use of wheat grain instead of high-protein feed in pheasant nutrition from 10 weeks of age causes a slight decrease in body weight and weight of breast muscles and a significant decrease in the weight of abdominal fat.

Rearing of broiler pheasants may end between 11 and 24 weeks of age. The date on which rearing ends is determined by the achievement of complete plumage

and body weight of about 1 kg. Torgowski et al. [8] demonstrated that rearing of game pheasants to 12 weeks of age using the semi-intensive (aviary) or intensive systems (in a closed building) does not guarantee that the pheasant carcass will have traits demanded by the consumers because carcass weight may be too low. These authors suggest that the period of pheasant rearing for meat should be extended to 16-18 weeks of age. However, this involves a considerable increase in feed intake per kg weight gain and moves the slaughter date to late autumn.

Previous studies showed that at 16 weeks of age, the weight of variously fed game pheasants ranges from 1035 to 1344.2 g for cocks and from 755 to 991.7 g for hens [1, 3, 6, 9]. The dressing percentage of pheasants was 73.2 in cocks and 73.0% in hens. Breast muscles accounted for 31.6% of carcasses in pheasant males and 30.5% in pheasant females. The respective values for leg muscles were 24.6 and 23.1%. The proportion of skin with subcutaneous fat was 6.9% in male carcasses and 7.7% in hens [1]. Lengthening the pheasant rearing period to 18 weeks of age, paralleled by the addition of whole wheat grain to the diet may positively affect the final body weight of the pheasants and carcass tissue composition while reducing management costs.

The aim of the study was to determine the effect of partial replacement of feed mixture with whole wheat grain on body weight, dressing percentage and carcass composition of game pheasants reared to 18 weeks of age.

## MATERIALS AND METHODS

The study was carried out in 2007 at the Experimental Farm of the Department of Poultry Breeding, belonging to the University of Technology and Life Sciences in Bydgoszcz. A total of 80 game pheasants were assigned to two feeding groups of 40 birds per group. Pheasants were kept in a confined building (in pens) to 8 weeks of age and later in separate aviaries outdoors. Birds were fed ad libitum. All the pheasants received a feed mixture (R-210) containing 27.0% crude protein and 11.8 MJ ME to 4 weeks of age. From 5 to 8 weeks of age, the control pheasants were fed a feed mixture (R-211) containing 23.5% protein and 12.1 MJ energy, and from 9 weeks to the end of the experiment a mixture (R-303) containing 17.0% protein and 11.5 MJ ME. Feed mixtures were made in PROVIMI-POLAND Company - divisionsin in Brzozowo and Świecie. In group B (experimental), a diet containing 70% feed mixture (as in group A) and 30% whole wheat grain was used from 5 weeks of age.

Pheasants were weighed individually at 18 weeks of age,

Table 1. Body weight and carcass components in game pheasants  
Tabela 1. Masa ciała i elementów tuszek bażantów łownych

Trait		Cocks		Hens		Cocks and hens	
		A	B	A	B	A	B
Body weight before slaughter (g)	x	1226.0 <sup>a</sup>	1421.4 <sup>b</sup>	946.9	953.2	1086.5*	1187.3*
	v	1.1	3.5	4.4	6.0	13.5	21.2
Weight of eviscerated carcass with neck (g)	x	866.1 <sup>a</sup>	1000.7 <sup>b</sup>	659.8	658.1	763.0*	829.4*
	v	1.7	5.4	5.7	8.5	13.9	22.5
Weight of neck (g)	x	39.6	41.3	26.2	26.8	32.9*	34.1*
	v	4.	2.2	8.9	6.2	21.0	22.7
Weight of wings (g)	x	98.1	104.2	71.1	71.8	84.6*	88.0*
	v	3.5	6.2	3.2	7.0	16.3	20.3
Weight of breast muscles (g)	x	277.3	310.4	205.8	192.0	241.6*	251.2*
	v	6.1	13.8	6.7	6.7	16.0	27.6
Weight of leg muscles (g)	x	209.1 <sup>a</sup>	247.0 <sup>b</sup>	161.8	150.5	185.5 <sup>a*</sup>	198.8 <sup>b*</sup>
	v	3.9	9.6	9.4	14.4	14.0	26.0
Weight of skin with fat (g)	x	56.0	64.7	51.7	49.2	53.9	56.9
	v	9.7	11.9	18.7	15.4	21.2	19.1
Weight of abdominal fat (g)	x	1.0	2.4	1.7	1.7	1.3	2.1
	v	102.0	176.0	76.5	168.0	84.4	167.0
Remainders of carcass (g)	x	185.0 <sup>a</sup>	230.7 <sup>b</sup>	141.5	166.1	163.2 <sup>a*</sup>	198.3 <sup>b*</sup>
	v	6.8	8.7	4.2	7.	14.7	19.3

Explanations :

A – pheasants were given feed mixtures to 18 weeks of age

B – from 5 weeks of age, pheasants were given 70% feed mixture and 30% whole wheat grain

a, b – mean values of traits in rows with different letters, separately for cocks, hens and birds of both sexes differ significantly ( $P \leq 0.05$ ).

\* - statistically significant differences between sexes ( $P \leq 0.05$ ).

which made it possible to determine their body weights and select the birds for dissection. Five cocks and five hens whose body weight was similar to average body weight of a given sex were chosen from each feeding group for slaughter. A total of 20 birds were slaughtered. After slaughter, plucking and evisceration, whole carcasses of

the birds were dissected [10]. Each carcass was dissected into breast muscles, leg muscles, neck, wings, skin with subcutaneous fat and abdominal fat. A skeleton with a small number of skeletal muscles was left after carcass dissection. Carcass meat, fat and bone content were also determined. The total amount of breast and leg muscles

Table 2. Dressing percentage and proportion of carcass components  
in game pheasants  
Tabela 2. Wydajność rzeźna i udział elementów w tuszce  
bażantów łownych

Trait		Cocks		Hens		Cocks and hens	
		A	B	A	B	A	B
Dressing percentage (%)	x	70.6	70.4	69.7	69.0	70.2	69.9
	v	1.8	2.4	1.4	3.7	1.2	3.1
Content of neck (%)	x	4.6 <sup>a</sup>	4.1 <sup>b</sup>	4.0	4.1	4.3	4.3
	v	4.1	6.5	2.2	10.5	8.6	9.5
Content of wings (%)	x	11.3 <sup>a</sup>	10.4 <sup>b</sup>	10.8	10.9	11.1*	10.6*
	v	4.3	3.3	4.4	5.2	4.8	4.9
Content of breast muscles (%)	x	32.0	31.0	31.2	29.2	31.6	30.1
	v	5.6	8.3	3.1	2.8	4.8	4.9
Content of leg muscles (%)	x	24.1	24.7	24.5	22.9	24.3	23.8
	v	2.9	6.4	8.1	6.7	5.8	7.5
Content of skin with fat (%)	x	6.5	6.5	7.8	7.5	7.1	7.0
	v	8.8	12.3	12.9	9.3	13.9	12.6
Content of abdominal fat (%)	x	0.1	0.2	0.2	0.2	0.2	0.2
	v	115.3	146.0	60.0	195.0	75.0	76.9
Content of remainders of carcass (%)	x	21.4	23.1	21.5 <sup>a</sup>	25.2 <sup>b</sup>	21.4 <sup>a</sup>	24.2 <sup>b</sup> *
	v	7.0	10.9	8.4	1.8	7.1	8.2

For explanations, see Table 1.

in carcass was regarded as meat. Total abdominal fat and skin with subcutaneous fat were regarded as fat. Bones were the skin, neck and carcass remainders isolated during dissection.

The numerical data collected were analysed statistically by calculating the means (x) and coefficients of variation (v) for the analysed traits. Significance of differences between the feeding groups was verified using Tukey's test.

## RESULTS AND DISCUSSION

The body weight of male game pheasants selected for

dissection at 18 weeks of age and fed complete diets throughout the experiment averaged 1226 g and was 195.4 g lower than the body weight of the cocks receiving 70% feed mixture and 30% whole wheat grain from 5 weeks of age. The difference in male body weight was statistically significant. Likewise, female pheasants receiving feed mixtures were lighter (946.9 g) than females fed the diet with wheat grain (953.2 g). Lower body weights of 16-week-old cocks and hens were obtained by Woodard et al. [9] and Sage et al. [6]. Meanwhile, Ricard and Petitjean [5], who reared game pheasants to 18 weeks of age, obtained slightly higher body weights of males and females than in our study.

Table 3. Content of meat, fat and bones in carcasses of game pheasants  
Tabela 3. Udział mięsa, tłuszczu i kości w tuskach bażantów łownych

Trait		Cocks		Hens		Cocks and hens	
		A	B	A	B	A	B
Content of carcass with neck							
Meat (g)	x	486.4 <sup>a</sup>	557.4 <sup>b</sup>	367.6	342.5	427.1*	450.0*
	v	3.7	11.1	7.4	9.7	14.9	27.3
Meat (%)	x	56.2	55.7	55.7 <sup>a</sup>	52.0 <sup>b</sup>	56.0	54.3*
	v	2.8	5.7	2.4	2.1	2.5	5.4
Fat (g)	x	57.1	67.1	53.4	50.9	55.2	59.0
	v	11.2	9.9	20.4	19.5	15.8	21.2
Fat (%)	x	6.6	6.7	8.1	7.7	7.2	7.1
	v	10.3	17.1	15.0	12.6	15.8	15.9
Bones (g)	x	322.7 <sup>a</sup>	376.2 <sup>b</sup>	238.8	264.7	280.7 <sup>a*</sup>	320.4 <sup>b*</sup>
	v	4.4	6.1	3.2	5.9	15.5	19.3
Bones (%)	x	37.2	37.6	36.2 <sup>a</sup>	40.3 <sup>b</sup>	36.9*	38.6*
	v	4.7	8.4	6.3	3.2	5.2	6.8

For explanations, see Table 1.

The carcasses of 18-week-old pheasant cocks receiving the feed mixtures weighed 866.1 g and were significantly lighter than the carcasses of pheasants fed the diet with wheat (1000.7 g). The carcass weight of hens was similar in both feeding groups (Tab. 1). The carcasses of cocks and hens (♂♀) fed the diet with wheat grain contained more breast and leg muscles as well as more skin with fat, abdominal fat and other parts. There were statistically significant differences between feeding groups in the weight of leg muscles and carcass remainders in cocks and birds of both sexes. Variation of most slaughter traits except the weight of skin with subcutaneous fat and abdominal fat was low and the coefficients of variation did not exceed 10% in male and female separate.

The dressing percentage of both male and female pheasants fed whole wheat grain averaged 69.9% and was 0.3% lower compared to birds receiving feed mixtures only (70.2%). In both feeding groups, dressing percentage was higher for cocks than for hens (Tab. 2). Higher dressing percentage values were reported for

game pheasants by Adamski and Kuźniacka [1] and Sarica et al. [7], and lower by Marzoni et al. [4].

The feeding of pheasants with complete diets alone had a positive effect on the carcass percentage of breast muscles, leg muscles, wings in the birds of both sexes together. The addition of whole wheat grain to the diet caused a significant increase in the percentage of carcass remainder. In an earlier study [1], a lower proportion of breast muscles was obtained in 16-week-old pheasants (31.0%) and a higher proportion in 20-week-old pheasants (33.2%). The proportion of leg muscles was similar or lower (23.9 and 23.0%, respectively) than in the pheasants evaluated in the present experiment.

The carcasses of male game pheasants fed wheat grain contained more meat, fat and bones (Tab. 3) compared to the carcasses of cocks receiving the feed mixtures alone. Hens had a higher weight of bones and a lower weight of meat and fat when fed whole wheat grain. The carcasses of both males and females had a greater weight of meat, fat and bones in the group fed a diet containing

wheat grain. Meanwhile, the carcasses of both males and females fed the feed mixtures had a higher percentage of meat (56.0 vs 54.3%) and fat (7.2 vs. 7.1%), and a lower percentage of bones (36.9 vs. 38.6%) compared to the carcasses of cocks and hens receiving wheat grain in their diets. In addition, statistically significant differences were found for meat weight and bone weight in cocks, for the proportion of meat in hens, and for the proportion of bones in hens and bones weight in hens and birds of both sexes. The coefficients of variation for the weight and proportion of meat, fat and bones assumed fairly high values in birds of both sexes, which was related to high sexual dimorphism in the pheasants.

## CONCLUSIONS

It was found that supplementing the feed mixture with 30% whole wheat grain from 5 weeks of age increased body weight, carcass weight and carcass parts in game pheasants. Dressing percentage ranged from 69.0 to 70.6% and was higher in cocks than in hens. Percentage of breast muscles, leg muscles, wings and skin with fat was lower, and percentage of carcass remainders higher in birds of both sexes receiving the wheat grain diet. The weight of meat, bone and fat was higher in cocks and hens receiving the feed mixtures and wheat grain.

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