Evaluating the carcass value of male pheasants in selected and non-selected population

David Zapletal[1], Pavel Suchý[1], Kateřina Karásková[2], Eva Straková[2]

[1]Department of Animal Husbandry and Animal Hygiene
[2]Department of Animal Nutrition
Faculty of Veterinary Hygiene and Ecology
University of Veterinary and Pharmaceutical Sciences Brno
Brno, Czech Republic

Abstract

The aim of this study was to evaluate the effect of the targeted selection of common pheasants (*Phasianus colchicus*) intended to result in a higher body weight at the age of 7 weeks on selected carcass traits in intensively fattened male pheasants. The average live body weight of the male pheasants at the end of 100 day fattening was 1 048.1 and 996.8 g for selected and non-selected population, respectively (P = 0.059). When carcass value was evaluated, we found that male pheasants from selected group showed a higher weight of carcass, unskinned thigh, skinned thigh, skinned neck, heart and liver as compared to males in the control group (P < 0.01). Selected male pheasants also showed a significantly higher gizzard weight than males in the control group (P < 0.05). However, the comparison of carcass yield and individual yields of carcass traits revealed that targeted selection resulted in a significant difference for heart weight only (P < 0.01).

Common pheasant, selection, males, fattening, carcass value

Introduction

More than 95% of the captively bred pheasants in Europe are raised for hunting, which means that any selection among these birds focuses primarily on their flying ability and perhaps their ability to survive in the wild nature (Rémignon 2004). Recently, however, we have also been seeing targeted fattening for meat production in Europe during the captive raising of pheasants (Mašek et al. 2007; Kokoszynski et al. 2011; Straková et al. 2011) as is the case in North America (Rémignon 2004), where a leucistic (white) form of the pheasant has been bred for fattening in fully controlled environmental conditions and is being sold on the market like ordinary poultry following slaughter (Roberson 2004). This white pheasant is a meat type of pheasant produced by targeted selection and hybridisation to attain a higher body weight and higher yield of breast muscle as compared to the "ordinary" common pheasant (Roberson 2004). As far as Europe is concerned, direct references in the literature to the targeted selection or hybridisation of the pheasant for this purpose have been sporadic to date (Zapletal et al. 2011; Kokoszynski et al. 2012).

Historically, global production of poultry meat has been directly connected with the targeted increase of the growth performance and carcass value of economically important species. Since the heritability of these important traits in poultry is of a mid to high level, the utilisation of targeted selection has played a significant part in attaining the existing level of yield capacity in meat types of poultry (Le Bihan-Duval et al. 2001; Lariviere et al. 2009).

The aim of this study was to assess the influence of targeted selection in pheasants aimed at achieving higher body weight on selected carcass traits in male pheasants intensively fattened to an age of 100 days.

Materials and Methods

The selected male pheasants came from a population of common pheasants (*Phasianus colchicus*) targetedly selected for higher body weight at the age of 49 days. These chicks were of the 3rd filial generation of offspring from a thus targetedly selected flock of pheasants at the Jinačovice pheasantry of the University of Veterinary

Address for correspondence:

Doc. Ing. David Zapletal, Ph.D.
Department of Animal Husbandry and Animal Hygiene
Faculty of Veterinary Hygiene and Ecology
University of Veterinary and Pharmaceutical Sciences Brno
Palackého tř. 1/3, 612 42 Brno, Czech Republic

Phone: +420 541 562 676
Fax: +420 541 562 675
E-mail: zapletald@vfu.cz
www.maso-international.cz

and Pharmaceutical Sciences Brno. Male pheasants of the same age from a population from the same pheasantry that had not been selected for non-targeted trait were used as a control. Fattening took place in an accredited experimental stable of the Department of Animal Nutrition and the Department of Animal Husbandry and Animal Hygiene of the Faculty of Veterinary Hygiene and Ecology at the University of Veterinary and Pharmaceutical Sciences Brno, under fully controlled environmental conditions, with 26 one-day-old male pheasants used in both the individual groups evaluated. The pheasants were fattened to an age of 100 days, with the same feeding ration used for both groups at the same age. Fifteen male pheasants from each group were chosen at random at the end of fattening and were killed by bleeding after stunning. Scalding and plucking were then performed, and the head, feet and internal organs removed. During carcass analysis, the pelvic limbs were removed from the body at the hip joint, and the breast muscle separated on the thorax at the shoulder joint and from the sternum. After the breast muscle and the unskinned thighs had been weighed, the thighs were skinned. The skinned thighs were then weighed again, after which they were deboned. Of the edible entrails, the heart, liver and stomach were weighed after the gizzard had been cleaned and the gall bladder removed from the liver. All the present abdominal fat was weighed and the neck skinned. Calculation of the yields of individual carcass traits was performed as the proportion of their weight to the live body weight of the pheasants before slaughter.

The statistical evaluation of the data was performed by the program Statistica CZ, version 9.0. Single-factor ANOVA was used to determine the conclusiveness of differences between the groups assessed.

Results

As far as the live body weight of male pheasants at the age of 100 days is concerned, individuals in the selected group attained a higher average weight (1 048.1 g), though the difference was not tested as statistically significant ($P = 0.059$) when compared with the weight of male pheasants in the non-selected group (996.8 g). When carcass value was assessed, we discovered that male pheasants from the selected group attained a highly significantly higher carcass weight and weight of unskinned thighs, skinned thighs, skinned neck, heart and liver than male pheasants from the control group (Table 1). A conclusively higher gizzard weight ($P < 0.05$) was also confirmed in selected pheasants as compared with pheasants from the control group.

Table 1. Carcass traits assessed in individual populations of male pheasants

Trait (g)	Population				P
	Selected		Non-selected		
	x	sx	x	sx	
Live weight	1103.6	59.01	997.1	61.97	**
Carcass	789.7	54.59	723.0	43.48	**
Breast muscle	184.5	21.82	179.4	13.24	n.s.
Unskinned thighs	230.3	19.47	210.7	15.81	**
Skinned thighs	212.1	16.40	193.1	14.30	**
Thigh muscle	161.7	16.28	149.8	15.01	n.s.
Skinned neck	37.4	3.99	31.8	3.61	**
Heart	9.8	1.37	7.4	1.06	**
Liver	24.4	3.10	20.6	3.23	**
Gizzard	23.3	2.43	20.4	3.71	*
Abdominal fat	2.2	3.93	1.2	2.44	n.s.

x: average; sx: standard deviation; **: $P < 0.01$; *: $P < 0.05$; n.s.: not significant.

When comparing the carcass yield and the yields of individual carcass traits (Table 2), we found a significant difference in only the heart yield indicator, with a higher value being discovered in selected pheasants as compared to control pheasants. As far as the actual carcass yield is concerned, i.e. the proportion of carcass weight to live weight,

Table 2. Yield of carcass traits assessed in male pheasants to live weight before slaughter in dependence on the population

Indicator (%)	Population				P
	Selected		Non-selected		
	x	sx	x	sx	
Carcass yield	71.6	2.04	72.5	1.97	n.s.
Yield of breast muscle	16.7	2.09	18.0	0.84	n.s.
Yield of unskinned thighs	20.9	1.31	21.1	0.91	n.s.
Yield of skinned thighs	19.2	0.98	19.4	0.71	n.s.
Yield of thigh muscle	14.7	1.10	15.0	0.97	n.s.
Yield of skinned neck	3.4	0.34	3.2	0.44	n.s.
Yield of heart	0.9	0.11	0.8	0.09	**
Yield of liver	2.2	0.33	2.1	0.31	n.s.
Yield of gizzard	2.1	0.19	2.1	0.33	n.s.

x: average; sx: standard deviation; **: $P < 0.01$; n.s.: not significant.

its value was 71.6% in selected pheasants and 72.5% in the control group of pheasants ($P > 0.05$).

Discussion

The higher live weight of male pheasants from selected flock before slaughter was associated with the higher weight of the majority of carcass traits assessed in comparison with pheasants from the control group. A comparison of the yield of individual carcass traits indicates, however, that three-year selection of pheasant chicks aimed at higher growth intensity led merely to a significantly higher heart yield in the selected pheasants. Emmerson (2003) states that an increase in the body size of poultry is often associated with differing compositions of the carcass, with an increase in the muscle yield resulting from selection.

We noted an increase only in absolute values for carcass traits in our study, and not in the yields assessed. The results obtained in this study confirm the results found by Gaya et al. (2006), in their study the body weight of chickens was genetically highly positively correlated with the weight of the carcass, the breast muscle and the thighs. This indicates that direct selection aimed at increasing live body weight should also result in an increase weight of the carcass, the breast muscle and the thighs (Gaya et al. 2006). In the view of the results produced by this study, it seems likely that three-year direct selection is a period of time too short to have a profound effect in increasing the proportion of important muscular parts of the carcass in male pheasants.

Higher body weight in selected male pheasants was associated with a higher absolute weight of the heart, liver and gizzard as compared to the control group of pheasants. When comparing the yield of these internal organs in the two groups, however, it can be seen that a significantly higher yield in selected males was demonstrated only for the heart. These results are in agreement with findings in broiler chickens, where the higher weight was also associated with a higher heart weight. This relationship was correlated genetically at a level of 0.60 (Gaya et al. 2006). According to McEntee et al. (2000) the relative size proportion of the internal organs in broiler chickens often falls as a result of selective breeding. Decuypere et al. (1994) claim that the heart and lungs, similarly to the guts, liver and kidneys, have a considerably higher need for metabolisable energy than skeletal muscle (per unit of weight). In the case of common selective pressure on growth intensity and feed conversion, which is very frequent in the improvement of poultry, this can increase the risk of retarded development of these vitally important oxygen-transporting organs (Decuypere et al. 1994). The size of the organs, and the heart in particular, may itself become a limiting factor in the selection of poultry with a view to their proper physical development (Lin 1981).

Conclusions

Targeted three-year selection of pheasants aimed at achieving higher body weight led to a significantly higher weight of carcass, unskinned thighs, skinned thighs, skinned neck, heart, liver and gizzards in males fattened to the age of 100 days as compared to males from a non-selected population. When the yields of carcass traits were compared, however, selection only resulted in an increase of relative weight of the heart in the pheasants.

Acknowledgements

This study received financial support from the project NAZV QH 91276.

References

Decuypere E, Vega C, Bartha T, Buyse J, Zoons J, Albers GAA 1994: Increased sensitivity to triiodthyronine (T3) of broiler lines with a high susceptibility for ascites. Brit Poult Sci **35**: 287-297

Emmerson DA 2003: Breeding objectives and selection strategies for broiler production. In: Muir WM, Aggrey SE (eds.) Poultry Genetics, Breeding and Biotechnology. CABI Publishing, Wallingford, UK, 113-126

Gaya LG, Ferraz JBS, Rezende FM, Mourao GB, Mattos EC, Eler JP, Michelan T 2006: Heritability and genetic correlation estimates for performance and carcass and body composition traits in a male broiler line. Poult Sci **85**: 837-843

Kokoszynski D, Bernacki Z, Cisowska A 2011: Growth and development of young game pheasants (Phasianus colchicus). Arch Tierzucht **54**: 83-92

Kokoszynski D, Bernacki Z, Duszynski L 2012: Body conformation and physicochemical and sensory properties of meat from pheasants of different origin. Czech J Anim Sci **57**: 115-124

Larivière JM, Michaux C, Verleyen V, Leroy P 2009: Heritability estimate and response to selection for body weight in the Ardennaise chicken breed. Int J Poult Sci **8**: 452-456

Le Bihan-Duval E, Berri C, Baeza E, Millet N, Beaumont C 2001: Estimation of the genetic parameters of meat characteristics and of their genetic correlations with growth and body composition in an experimental broiler line. Poult Sci **80**: 839-843

Lin CY 1981: Relationship between increased body weight and fat deposition in broilers. World Poultry Sci J **37**: 106-110

Mašek T, Severin K, Horvatek D, Janicki Z, Konjević D, Slavica A, Mikulec Ž 2007: Serum parameters of intensively reared common pheasant (Phasianus colchicus) during fattening. Arch Geflugelkd **71**:135-138

McEntee GM, Rance KA, Gavi A, McDevitt RM 2000: Organ morphology in selected and unselected broilers: Implications for a limit to future improvements in yield? 21st World poultry congress. Montreal, CD-ROM

Rémignon H 2004: Production of turkeys, geese, ducks and game birds. In: Mead CG (eds.) Poultry meat processing and quality. Woodhead Publishing, Cambridge, UK, 211-231

Roberson KD 2004: White pheasant production: evaluation of brooding space, phase feeding method and carcass composition. Midwest Poultry Consortium. Available at: http://www.mwpoultry.org/ProjectPDFs/04-15.pdf

Straková E, Suchý P, Karásková K, Jámbor M, Navrátil P 2011: Comparison of nutritional values of pheasant and broiler chicken meats. Acta Vet Brno **80**: 373-377

Zapletal D, Vitula F, Straková E, Suchý P, Kroupa L. The effect of selection on the growth rate of pheasant chicks in the 1st generation of offspring. Book of Abstracts of 18th International Conference Krmiva, Opatia, June, 2011