Effect of perches on morphology, welfare and behaviour of captive reared pheasants

Francesco Santilli & Marco Bagliacca

To cite this article: Francesco Santilli & Marco Bagliacca (2017) Effect of perches on morphology, welfare and behaviour of captive reared pheasants, Italian Journal of Animal Science, 16:2, 317-320, DOI: 10.1080/1828051X.2016.1270781

To link to this article: http://dx.doi.org/10.1080/1828051X.2016.1270781

© 2017 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

Published online: 16 Jan 2017.

Article views: 215

View related articles

View Crossmark data
Effect of perches on morphology, welfare and behaviour of captive reared pheasants

Francesco Santilli and Marco Bagliaccab

aStudio di Gestione Faunistica, Campiglia M.ma LI, Italy; bDipartimento di Scienze Veterinarie, University of Pisa, Pisa, Italy

ABSTRACT
This study investigated the effect of providing elevated perches in growing pens on the morphology and behaviour of young pheasants. Pheasants reared with perches from one week old were observed roosting off the ground significantly more frequently when moved into a pen containing trees at five weeks old than pheasants reared without perches (roosting pheasants: 24.3% vs. 6.7%; \(p < .01\)). The presence of perches reduced the level of plumage damage caused by feather pecking (damage scores: 2.3% vs. 2.1%; \(p < .05\)). Pheasants reared in huts with perching were larger overall than those from control huts, in particular were heavier (weights: 356.9 g vs. 345.2 g) and had longer and thicker tarsi than control pheasants (60.61 mm vs. 59.35 mm and 4.715–6.571 mm vs. 4.705–6.412 mm, respectively). Since roosting on tree branches is an important anti-predator behaviour, providing perches at an early stage of life in the captive rearing environment may be helpful in order to improve survival of the captive reared pheasant after release in the wild. Furthermore, the study suggests that a simple and easy husbandry technique, providing elevated perches, may improve the welfare and fitness of farm-reared game birds.

ARTICLE HISTORY
Received 14 October 2016
Revised 2 December 2016
Accepted 7 December 2016

KEYWORDS
Game-birds rearing; anti-predator behaviour; roosting; feather pecking; releasing

Introduction
It is widely known that the survival of artificially reared phasianidae in nature is much lower than survival of wild phasianidae. Farm reared birds show behavioural differences from wild birds and in particular they show poor anti-predator behaviour (Deeming et al. 2011; Dowell 1992). For example, Garson et al. (1992) reported that artificially reared cheer pheasants Catreus wallichii roosted on the ground at night and therefore were prone to predation. The condition that pheasants experience when raised under captive conditions greatly differ from the natural situation (an absence of parents during rearing, group size, availability of cover and so on). Pheasants and other phasianidae released for hunting or restocking are generally artificially reared in unnatural and spatially simple environments (Buner & Schaub 2008). Individuals that are subjected to unnatural or artificial rearing conditions prior to release may lack the opportunities to acquire essential survival skills, such predator detection and avoidance, food acquisition and processing techniques (Whiteside et al. 2015). The morphology and behaviour of pheasants are influenced by conditions experienced in the first stage of life (Ohlsson & Smith 2001; Ohlsson et al. 2002; Ferretti et al. 2012; Orledge et al. 2012; Santilli et al. 2012) and may have fitness consequences. Furthermore, appropriate design of the artificial rearing environment is considered fundamental to ensure bird welfare. A study on breeding pheasants showed that sight barriers may improve welfare by reducing potentially harmful aggressive interactions (Deeming et al. 2011). Laying pheasant hens kept in enriched cages (with perches and a hiding place) were less stressed and fearful than pheasants kept in conventional cages (Hrabcakova et al. 2012). Recently Whiteside et al. (2016) showed that the enrichment of rearing habitats of pheasants during the first weeks of life, achieved by adding elevated perches, provoked an interrelated suite of morphological, cognitive and behavioural changes, culminating in decreased mortality of birds after their release in the wild.

The aim of our study was to evaluate the effect of the presence of elevated perches on the morphology and behaviour of young pheasants and, in particularly, on roosting behaviour which is one of the main...
anti-predator behaviour of this species (Whiteside et al. 2016).

Material and methods

The experiment was performed in 2016 at the Centro Pubblico di Produzione Selvaggina di Castagneto Carducci (Livorno, Italy), a small game farm managed by the local hunting club. In April, 300-day-old pheasants from a commercial supplier were randomly allocated to one of the six huts of 2.5 m × 3.5 m (50 chicks per huts). Three huts were provided with perches in the form of wooden scaffolds with perches placed at 30, 60 and 120 cm in height, whereas the other three huts were used as controls without any perching. Water and age-appropriate commercial game-feed was available ad libitum throughout the whole rearing period. At the 5th week, a sample of 30 birds for each treatment (15 male and 15 female) were weighed (±1 g) and measured for tarsus length and thickness (min and max) using a digital calliper (±0.1 mm) following methods in Bagliacca et al. (1985). Plumage damage on the back and neck of the sampled pheasants was evaluated using a scale ranging from 0 (low/no damage) to 5 (high levels of damage) following methods in Riber et al. (2007).

In the fifth week, all the birds were marked with coloured leg bands, identifying which of the two treatments they had been reared in, and were placed in a 20 m × 6 m × 3.5 m pen containing trees and elevated artificial perches. At dusk, for the following three weeks, we observed pheasants roosting on trees or perches and identified their rearing condition from their leg bands.

Statistical analysis

Morphological measures were analysed within huts by GLM in relationship to sexes treatments and their interaction. Since damage scores are not normally distributed, GzLM (Ordinal Logistic Fit test) was performed according to the same previous model. Percentages of roosting pheasants were simply analysed by a series of Fisher’s exact tests with the assumed probability that 50% of birds came from each treatment group, since at dusk it was not possible to discriminate males from females (SAS 2009).

Results and discussion

Pheasants reared in huts with perching were larger overall than those from control huts (MANOVA: Perching Pillai’s Trace \( F = 2.90, p = .025 \)). As expected in a sexually dimorphic species, males were larger than females (MANOVA: Sex, Pillai’s Trace \( F = 45.6, p < .001 \)), but there was no differential effect of the provision of perches between the sexes (MANOVA: Perching × Sex Pillai’s Trace \( F = 0.23, p = .92 \)). The differences were primarily driven by differences in body mass (MANOVA: Dependent variable = Mass, \( F = 4.12, p = .045 \)).

Our four morphometric measures of body size could be summarised by a single component which explained 62.3% of the total variance, with all four measures loading on the first PC with scores of >0.65. Pheasants reared in huts where perching had been added were heavier and had longer and thicker tarsi when five weeks old than pheasants reared in control huts where there was no opportunity to perch (Table 1). As expected in a sexually dimorphic species, males were larger than females (Sex \( F = 166.6, p < .001 \)). The presence of perches in a rearing pen acted in the same way on males and females (interactions not significant Perching × Sex \( F = 0.58, p = 0.449 \)). Pheasant reared in the huts with perches showed less plumage damaged than pheasants reared in the huts

### Table 1. Morphological measures collected at the 5th week of age (n = 30 each subgroup).

|                | Body weight, g | Tarsus length, mm | Max tarsus thickness, mm | Min tarsus thickness, mm |
|----------------|----------------|-------------------|--------------------------|--------------------------|
| No perches     |                |                   |                          |                          |
| Male           | 384.5a         | 60.97ab           | 6.65a                    | 4.86a                    |
| Female         | 305.8b         | 57.72b            | 6.17b                    | 4.55b                    |
| With perches   |                |                   |                          |                          |
| Male           | 391.8a         | 62.09a            | 6.81a                    | 4.83a                    |
| Female         | 321.9b         | 59.12b            | 6.33b                    | 4.60b                    |
| No perches     | 345.2          | 60.61             | 6.57                     | 4.72                     |
| With perches   | 356.9          | 60.61             | 6.57                     | 4.72                     |
| Standard error of mean | 2.88        | 0.33              | 0.04                     | 0.03                     |
| F values of tested effects |          |                   |                          |                          |
| Perches        | 4.12*          | 3.65*             | 3.73*                    | 0.04, ns                 |
| Sex            | 166.6***       | 22.2***           | 33.7***                  | 25.8***                  |
| Interaction sex × perches | 0.58, ns       | 0.04, ns          | 0.002, ns                | 0.64, ns                 |

Subgroupings bearing different letters differ per \( p < .05 \): *significant effect; **p < .05 tested effects; ***significant effect \( p < .05 \); ****high significant effect \( p < .001 \).
without perches (GzLM: Perching LR$^2 = 6.85$, df = 1, 
P = .009, Figure 1) although we found no difference in damage either between the overall sexes (GzLM: 
Sex LR$^2 = 2.28$, df = 1, P = .13) and no interaction between sex and perching provision (GzLM: 
Perching*Sex LR$^2 = 0.48$, df = 1, P = .49). Roosting behaviour after release into large outdoor pens was strongly affected by early rearing conditions with pheasants from huts with perching added were more likely to be detected roosting off the ground at night than birds from control huts (Figure 2) although the difference decreased with time, probably because non-roosting pheasants learned to roost by the roosting pheasants.

Pheasant roosting behaviour was positively affected by early access to perches. Since roosting on tree branches is an important anti-predator behaviour, providing perches early in life in the captive rearing environment may be helpful to improve survival of pheasants immediately after their release in the wild (Whiteside et al. 2016). Mortality of captive reared pheasants in the wild is very high (up to 48.2% during their first 10 days after the release, Robertson 1988) and is primarily due to predation (Ferretti et al. 2012) in the first few weeks after release. Early exposure to a more naturalistic environment gives the birds opportunities to develop an appropriate anti-predator behaviour. In addition to effects on behaviour, perches affect the morphology of birds: flying to perches and wing flapping to balance on elevated perches stimulates a greater development of pectoral and thigh muscles and consequently increases skeletal mass (Whiteside et al. 2016). Increased pectoral mass may facilitate increased take-off power which in turn benefits predator evasion (Tobalske & Dial 2000). Poor flying ability is typical of captive reared pheasants compared with wild ones and it is considered one of the factors that causes their low survival in the wild (Dowell 1992). In this study, the differences in morphology (body mass and bone thickness) between treatment and control groups were lower than those found by Whiteside et al. (2016), perhaps because of a shorter study period and a smaller sample size in the current study.

The presence of perches serves as habitat enrichment and seems to reduce feather damage to pheasants by reducing their levels of aggression to one another. Young pheasants interact violently as they assert dominance and this can be marked in confined commercial rearing system (Deeming et al. 2011). Access to perches may offer an opportunity to escape aggression from dominant individuals, with subordinates using the raised positions.

**Conclusions**

The study showed that a cheap and simple modification to the heated huts, i.e. the provision of perches, produces a series of positive effects on the behaviour and welfare of young pheasants reared for early releasing purpose. Pheasants reared in huts with perches showed lower plumage damage and a higher propensity to roost on tree branches or elevated perches after their transfer to the flying pens. This improved behaviour may reduce mortality from ground predators when pheasants are released in the wild. The simple provision of perches early in life in the heated huts may provide a cheap device, accessible to every game farmer, that improves the welfare
and anti-predator behaviour of pheasants destined to be released in the wild.

**Disclosure statement**

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

**Funding**

The study was funded by Confederazione Cacciatori Toscana, Ambito Territoriale di Caccia Livorno and University of Pisa.

**References**

Bagliacca M, Chiarossi M, Mori B. 1985. Effetto del livello proteico-aminoacidico nella alimentazione della starna (Perdix perdix L.) durante le prime tre settimane di vita. Riv Di Avicoltura. 54:29–34.

Buner F, Schaub M. 2008. How do different releasing techniques affect the survival of reintroduced grey partridges Perdix perdix? Wildl Biol. 14:26–35.

Dowell SD. 1992. Problems and pitfalls of gamebird reintroduction and restocking: an overview. Gibier Faune Sauvage. 9:773–780.

Deeming DC, Hodges HR, Cooper JJ. 2011. Effect of sight barriers in pens of breeding ring-necked pheasants (Phasianus colchicus): I. behaviour and welfare. Brit Poultry Sci. 52:403–414.

Ferretti M, Falcini F, Paci G, Bagliacca M. 2012. Captive rearing technologies and survival of pheasants (Phasianus colchicus L.) after release. Ital J Anim Sci. 11:e29.

Garson PJ, Young L, Kaul R. 1992. Ecology and conservation of the cheer pheasant Catreus wallichii: studies in the wild and the progress of a reintroduction project. Biol Conserv. 59:25–35.

Hrabcakova P, Bedanova I, Voslava E, Piletskova V, Vecerek V. 2012. Evaluation of tonic immobility in common pheasant hens kept in different housing systems during laying period. Arch Tierz. 55:626–632.

Ohlsson T, Smith HG. 2001. Early nutrition causes persistent effects on pheasant morphology. Physiol Biochem Zool. 74:212–218.

Ohlsson T, Smith HG, Råberg L, Hasselquist D. 2002. Pheasant sexual ornaments reflect nutritional conditions during early growth. Proc Biol Sci. 269:21–27.

Orledge JM, Blount JD, Hoodless AN, Pike TW, Royle NJ. 2012. Synergistic effects of supplementation of dietary antioxidants during growth on adult phenotype in ring-necked pheasants, Phasianus colchicus. Funct Ecol. 26:254–264.

Riber AB, Wichman A, Braastad BO, Forkman B. 2007. Effects of broody hens on perch use, ground pecking, feather pecking and cannibalism in domestic fowl (Gallus gallus domesticus). Appl Anim Behav Sci. 106:39–51.

Robertson PA. 1988. Survival of released pheasants, Phasianus colchicus, in Ireland. J Zool. 214:683–695.

Santilli F, Galardi L, Bagliacca M. 2012. First evaluation of different captive rearing techniques for the re-establishment of the red legged partridge populations. Avian Biol Res. 5:147–153.

SAS. 2009. JMP®-user guide. 2nd ed. Cary, NC: SAS Institute Inc.

Tobalske BW, Dial KP. 2000. Effects of body size on take-off flight performance in the Phasianidae (Aves). J Exp Biol. 203:3319–3332.

Whiteside MA, Sage R, Madden JR. 2015. Diet complexity in early life affects survival in released pheasants by altering foraging efficiency, food choice, handling skills and gut morphology. J Anim Ecol. 84:1480–1489.

Whiteside MA, Sage R, Madden JR. 2016. Multiple behavioural, morphological and cognitive developmental changes arise from a single alteration to early life spatial environment, resulting in fitness consequences for released pheasants. Open Sci. 3:160008.