View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by Archivio istituzionale della ricerca - Alma Mater Studiorum Università di Bologna

Italian Journal of Animal Science

ISSN: (Print) 1828-051X (Online) Journal homepage: https://www.tandfonline.com/loi/tjas20

Effects of transport and lairage on mortality, liveweight loss and carcass quality in broiler chickens

M. Bianchi, M. Petracci & C. Cavani

To cite this article: M. Bianchi, M. Petracci & C. Cavani (2005) Effects of transport and lairage on mortality, liveweight loss and carcass quality in broiler chickens, Italian Journal of Animal Science, 4:sup2, 516-518, DOI: 10.4081/ijas.2005.2s.516

To link to this article: https://doi.org/10.4081/ijas.2005.2s.516

© 2005 Taylor & Francis Group LLC

Published online: 03 Mar 2016.

Submit your article to this journal

Article views: 366

View related articles

Citing articles: 1 View citing articles

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=tjas20

Effects of transport and lairage on mortality, liveweight loss and carcass quality in broiler chickens

M. Bianchi, M. Petracci, C. Cavani

Dipartimento Scienze degli Alimenti, Università di Bologna, Italy

Corresponding author: Claudio Cavani. Dipartimento Scienze degli Alimenti. Piazza Goidanich 60, 47023 Cesena, Italy – Tel: +39 0547 636130 – Fax: +39 0547 382348 – Email: ccavani@disa.unibo.it

RIASSUNTO – Influenza del trasporto e della sosta premacellazione sulla mortalità, sulla perdita di peso e sulla qualità della carcassa di pollo. *Nel corso della ricerca sono stati esaminati 321 lotti di broilers macellati in condizioni industriali su cui sono stati determinati i seguenti parametri: tasso di mortalità, perdita di peso vivo, percentuale di carcasse non idonee al consumo, percentuale di ematomi in petto, cosce ed ali. Gli animali trasportati per tempi più brevi (<3,5 h) hanno fatto rilevare un tasso di mortalità inferiore rispetto a quelli trasportati per tempi medi (3,5-5 h) e lunghi (>5 h) (0,24* vs. *0,41 e 0,45%; P<0,01). La perdita di peso è risultata superiore (P<0,01) per tempi di trasporto più lunghi (2,09%) rispetto a quanto osservato per i tempi medi (1,87%) e brevi (1,27%). Negli animali sottoposti ai trasporti più brevi è stata inoltre rilevata una superiore incidenza di ventrigli con un eccessivo stato di riempimento. La durata della sosta premacellazione non ha influenzato significativamente alcuno dei parametri considerati.*

Key words: broiler chicken, transport, lairage, carcass quality.

INTRODUCTION – Before broiler chickens are slaughtered, they are subjected to an array of events such as feed the withdrawal of feed, catching, loading into crates or coops, and transportation to a processing plant. After transportation, the birds are unloaded in a holding area and subjected to a variable lairage time till the moment of slaughter. Major problems associated with *ante mortem* factors have been associated with mortality (birds that died between catching and the moment of slaughter or "dead on arrival", DOA), live weight loss as well as carcass defects (haemorrhages, bruises and broken bones) and meat quality attributes such as colour, texture, and functional properties (Fletcher, 1991; Petracci *et al.*, 2001; Barbut, 2002; Nijdam *et al.*, 2004).

The aim of this study was to evaluate the effects of transport and lairage times on mortality, live weight loss and carcass quality in broiler chickens.

MATERIALS AND METHODS – The study was conducted on a total of 321 broiler flocks slaughtered at a commercial slaughter house from September 2002 to May 2003. The flocks varied in genotype (Ross 508 or Cobb 500), gender, and slaughter age (from 38 to 55 d). All broiler flocks were loaded into crates and transported by road from the farm to processing plant. Upon arrival at the processing plant, the crates with broilers were laired in a holding area with fans and water sprinkler systems to control environmental conditions. Before slaughtering, mortality during preslaughter time (dead-on-arrival chickens measured at the carousel table), live weight loss (the difference between the weight measured at catching and after the arrival to the slaughter house) were recorded for each flock transport time (elapsed time from the broiler farm to the slaughter house), lairage time (time spent in holding area). After slaughtering, the percentage of condemned car-

casses (carcasses not passing the veterinary inspection or not prone for human consumption); downgraded breasts, legs and wings (breasts, legs and wings presenting red discoloured haemorrhages), as well as full gizzards (ventriculus presenting an excessive quantity of *ingesta* after cutting) were evaluated for each flock.
The incidence of condemned carcasses was evaluated on overall carcasses for each flock, whereas the incidence of downgraded breasts, legs and wings, and full gizzards were measured on 200 carcasses (or 200 gizzards) per flock randomly taken on the processing line. To evaluate the effect of transport and lairage time on mortality, live weight loss and carcass quality, three classes for each treatment were established as follows: transport time, short (<3.5 h), medium (3.5-5 h) and long (>5 h); lairage time, short (<5 h), medium (5-7 h) and long (>7 h). Two-way ANOVA was performed with GLM/SAS® (SAS Institute, 1988) using a model that included transport time (short, medium, long), lairage time (short, medium, long) as well as their interaction.

RESULTS AND CONCLUSIONS – The results for mortality, live weight loss and carcass defects for both transport and lairage time treatments are presented in Table 1.

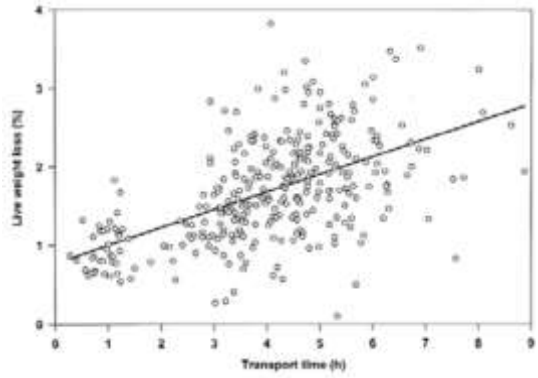
Table 1. Influence of transport and lairage time on mortality, live weight loss, and carcass defects.

	Transport time			Lairage time			
	Short (≤3.5 h)	Medium (3.5-5 h)	Long (>5 h)	Short (≤5 h)	Medium (5-7 h)	Long (>7 h)	SEM*
Flock n.	110	126	85	114	105	102	
Mortality (%)	0.24B	0.41A	0.45A	0.33	0.40	0.35	0.03
Live weight loss (%)	1.27C	1.87B	2.09A	-	-	-	0.04
Condemned carcass (%)	0.92	0.90	0.89	0.91	0.92	0.88	0.03
Downgraded breast (%)	2.06	2.51	2.27	2.02	2.30	2.59	0.14
Downgraded leg (%)	1.75	1.59	1.65	1.67	1.78	1.52	0.05
Downgraded wing (%)	9.46	8.74	9.08	9.25	9.29	8.67	0.13
Full gizzard (%)	4.86a	1.98b	1.53b	3.42	2.29	2.79	0.53

A-C Different letters on the same row correspond to significant differences (capital letters: P<0.01; lower case: P<0.05).
* No interactions were found between transport and lairage time.

The shortest transport time (≤3.5 h) exhibited the lowest (P<0.01) mortality rate of birds in respect with medium (3.5-5 h) and long (>5 h) transport times which were not different from each other. These results are consistent with those reported by Warriss *et al.* (1999) who found that transport times longer than 4h determined an increase of about 80% in the prevalence of DOA. Nijdam *et al.* (2004) pointed out that the risk of death during transport increases enormously as time increases. As discussed by Warriss *et al.* (1999), reduced mortality during transport would result from closer control of environmental conditions and more careful bird handling during catching and loading of the birds into the transport crates.
Birds transported for less than 3.5 h also exhibited a significantly lower live weight loss compared to medium (3.5-5 h) and long (>5 h) transport times (1.27 *vs.* 1.87 *vs.* 2.09%, respectively). These results are consistent with several previous reports. When live weight loss is reported on a per hour basis (0.23%/h) (Figure 1), the results are similar to those found by several authors (Warriss *et al.*, 1999).

Figure 1. Relationship between transport time and live weight loss in 321 flocks of broiler chickens (Live weight loss % = 0.23 x Transport time (h) + 0.77; R^2=0.30).



There were no significant differences by transport time for the incidence of condemned carcass, downgraded breast, leg and wing. However, birds transported for a short time had a significantly higher incidence of full gizzard than those transported for medium and long times. This could be due to a wrong application of the feed withdrawal program that does not allow minimum feed withdrawal periods of 8 h determining an incomplete clearance of gastrointestinal tracts, increasing the probability of carcass contamination and cross-contamination during commercial automated evisceration (Bilgili, 2002; Northcutt *et al.*, 2003). Hence, calculation of total preslaughter feed withdrawal period must include the time birds spend fasting in the house, in transit, and in lairage at the plant.

The lairage time did not affect mortality rate and carcass defects. However, in another study (Nijdam *et al.*, 2004) it was found that the risk of death during transport or lairage increases as time increases. This could be due to the efficient environmental control system adopted in the holding area of the processing plant considered in the present study.

In conclusion, this research has shown that long preslaughter transport can negatively affect animal welfare and economics of production by increasing the mortality rate and process yield by increasing live weight loss of chickens broilers. Moreover the need of more controlled application of feed withdrawal programs (by taking into account the time birds spend fasting in the house, in transit, and in lairage at the plant) before slaughtering was evidenced especially for shorter transport.

REFERENCES – **Barbut**, S., 2002. Catching and hauling live birds. In: Poultry products processing. An industry guide. CRC Press, New York, USA, pp 61-80. **Bilgili**, S.F., 2002. Slaughter quality as influenced by feed withdrawal. World's Poult. Sci. J. 58:123-130. **Fletcher**, D.L., 1991. Ante mortem factors related to meat quality. Quality of Poultry Products: I. Poultry Meat. Page 11-19 in Proc. 10th European Symposium on the Quality of Poultry Meat,. Spelderholt Jubilee Symposia, Doorwerth, The Netherlands. **Nijdam**, E., Arens, P., Lambooij, E., Decuypere, E., Stegeman, J.A., 2004. Factors influencing bruises and mortality of broilers during catching, transport, and lairage. Poult. Sci. 83:1610-1610. Northcutt, J.K., Berrang, M.E., Dickens, J.A., Fletcher, D.L., Cox, Jr. N.A., 2003. Effect of broiler age, feed withdrawal and transportation on levels of coliforms, *Campylobacter*, *E. coli* and *Salmonella* on carcasses before and after immersion chilling. Poult. Sci. 82:169-173. **Petracci**, M., Fletcher, D.L., Northcutt, J.K., 2001. The effect of holding temperature on live shrink, processing yield, and breast meat quality of broiler chickens. Poult. Sci. 80:670-675. **SAS Institute**, 1988. SAS/STAT Guide for Personal Computers. Version 6.03 ed. SAS Institute Inc., Cary, NC. **Warriss**, P.D., Wilkins, L.J., Knowles, T.G., 1999. The influence of ante-mortem handling on poultry meat quality. In: Richardson, R.I., Mead, G.C. (ed.). Poultry Meat Science. CABI Pub., Wallingford, Oxon, UK, pp 217-230.