COMPARISON OF WEIGHT LOSS OF BROILERS TRANSPORTED ON CONVENTIONAL OR CONTROLLED ENVIRONMENT TRAILERS

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Summary

The loss of liveweight during transportation of meat chickens from the farm to the factory was compared using two different trailer designs (conventional (open sided) versus tunnel ventilated (close sided)) and over six transportation distances (ranging from 20km to 109km). The loss of liveweight of the birds was greater in the conventional trailer than in the tunnel ventilated trailer. The birds from the more distant farms had a greater liveweight loss than those from the closer farms. The prediction of liveweight loss of birds transported on the conventional trailer was Weight loss (g) = 5.22*distance (km) – 5.23* travel time (min) + 96.42. The linear relationship between weight loss and vehicle speed on the conventional trailer was Weight loss (g) = 3.36*speed (km/hour) – 95.87. Weight loss in the conventional trailer at 48km/h was equal to the weight loss in the tunnel ventilated trailer. It is recommended that the tunnel ventilated trailer be used where the average speed of the trailer would be greater than 48km/h.

I. INTRODUCTION

Once broiler chickens have attained the desired mean weight and spread of weights, they are caught, placed into crates and transported by truck from the growing site to the processing plant. The type of trailer used to transport the birds from the farm to the processing plant differs depending on the individual poultry organisation. Depending on the trailer design, the birds may be exposed to extreme ambient environmental conditions including high and low temperatures and high wind speeds during transportation from the farm to the factory (Kettlewell et al., 1993). The distance of the journey from the farm to the processing plant can range from 20km to 230km and the duration can range from 20 minutes to 4 hours (Freeman, 1984).

The handling and transportation of meat chickens from the point of collection on farm to the point of receival at the processing plant results in the loss of bird liveweight (Verkaamp, 1986). Verkaamp (1986) estimated broiler weight loss at a rate of 0.2-0.5% of bodyweight per hour for broilers in a shed without feed and water.

The loss of liveweight of broilers from the point of collection on farm to receival at the processing plant may be influenced by a number of factors. Three of these factors include the design of the trailer, the distance that the birds are transported from the farm to the factory and the duration of the journey. It is in the interest of the grower and the meat chicken company that the volume of liveweight loss under Australian environmental conditions is quantified and the development of improved management procedures be implemented to minimise liveweight loss. Minimising the loss of liveweight will improve bird wellbeing, avoid negative public perception, improve some environmental aspects of the chicken meat industry and have a financial benefit.

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II. METHODS

The individual liveweights of 480 Ross broiler birds were recorded using a Weltech digital scale at the point of collection on farm and, following transportation, on receival at the processing plant. Six Barter Enterprises Pty. Ltd. broiler contract farms in SE Queensland were selected at random. Eighty birds from one shed on each broiler farm were selected at random for the measurements. The distance of each farm in relation to the Barter Enterprises Pty. Ltd. processing plant were: farm 1 '109km', farm 2 '105km', farm 3 '90km', farm 4 '45 km', farm 5 '35 km' and farm 6 '20 km'. The average journey times from each farm over these distances were: farm 1 '108 min', farm 2 '97 min', farm 3 '84 min', farm 4 '40 min', farm 5 '39 min' and farm 6 '30 min'. A Tamdev mechanical harvester was used to collect and crate the birds within the sheds. Timing of the collection of birds was dependent on the specific weights and the spread of weights within each shed; however, all birds used in this trial were approximately the same age (49 ± 1 days). The birds were collected on farm at 22:00 and the average ambient environmental temperature was 16°C. Feed was withdrawn from the birds three hours prior to pick-up and water was withdrawn immediately prior to pick-up. Once the birds were collected and measurements conducted on farm, the birds were placed into four modules positioned at mid height along the length of each of the two trailers, a conventional trailer and a tunnel ventilated trailer. The conventional trailer was an open sided trailer and the tunnel ventilated trailer was a closed trailer, each holding 32 modules. The modules were held in place by steel bars that were pulled down over the modules. The tunnel ventilated trailer was covered by curtains held in place by buckles. To maintain ventilation for the birds, there were four tunnel ventilation fans located at the rear of the trailer that extracted air from the trailer. The air entered the trailer through an inlet area located at the front of the trailer. Each trailer was loaded simultaneously at the farm, left the farm at the same time and both trailers followed the same route to the processing plant. There were two trailers (a conventional and a tunnel ventilated) used at each farm; six farms or distances and four replicate modules of birds on each trailer. Ten birds were measured in each module, giving 40 measurements for each of the 12 treatments.

III. RESULTS

The mean loss in liveweight of the birds from the point of collection on farm to the point of receival at the processing plant was 83.2 g per bird equating to a mean liveweight loss of 3.1% of the birds' initial mean liveweight. The loss of liveweight of the birds from the point of collection on farm to the point of receival at the processing plant following transportation was significantly different (P<0.05) for: (1) the trailer type, (2) the farm, and (3) the interaction between the trailer type and the farms.

(1). The birds transported on the conventional trailer lost a mean liveweight of 101g per bird or 3.8% of the birds' initial mean liveweight. This was significantly (P<0.05) more than the mean loss of 66 g per bird or 2.5% of the initial mean liveweight for the birds transported on the tunnel ventilated trailer.

(2). The birds from some of the more distant farms had significantly (P<0.05) greater liveweight loss during transportation than the birds from some of the farms closer to the processing plant (Table 1).

(3). There was a significant (P<0.05) interaction between farm of origin and the type of transportation vehicle used, in relation to the loss of liveweight of the birds from the point
The combined effect of journey duration (min), distance (km) and speed of transport (km/h) of chickens on mean liveweight loss from the point of collection on farm to the point of receival at the processing plant

<table>
<thead>
<tr>
<th>Farm</th>
<th>Journey Duration</th>
<th>Distance</th>
<th>Speed</th>
<th>Mean weight loss from collection to receival at plant (g/bird)</th>
<th>Mean weight loss from collection to receival at plant (%)</th>
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</thead>
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<td>3.9 (ab)</td>
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<td>85.0 (b)</td>
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</table>

a, b, c, d : means within a column with a different postscript are significantly different (P<0.05). SEM = standard error of mean

of collection on farm to the receival at the processing plant. In five out of the six farms, there was significantly (P<0.05) less liveweight loss in the tunnel ventilated trailer. The situation was reversed for the birds transported from the closest farm (see Figure 1).

![Mean liveweight loss](image)

**Figure 1** The loss in liveweight of birds transported on conventional and tunnel ventilated trailers from six farms in SE Queensland (Mean±SEM)

There were significant correlations and regressions of liveweight loss in relation to transportation distance and time. The regression of liveweight loss of birds on transport distances using the conventional trailer was Weight loss (g) = 5.22*distance (km) – 5.23*travel time (min) + 96.42. As speed is a function of distance and time, a second regression analysis was conducted and the linear relationship between weight loss and average speed of the conventional trailer was Weight loss (g) = 3.36*speed (km/hour) – 95.87. Weight loss in the conventional trailer at 48 km/h was equal to the weight loss in the tunnel ventilated trailer.
IV. DISCUSSION

The effect of trailer type on mean loss of liveweight of meat chickens during transportation from the farm to the factory thus appears to be influenced by transport distance. Although the results suggested there was greater weight loss for the birds transported on the tunnel ventilated than for those on the conventional trailer from farms located closer (approximately 20km) to the processing plant, the reverse was the case for the longer transport distances. The average distance that the company transports birds is approximately 45 km and at that distance the weight loss in the conventional trailer was 33% greater.

The use of the tunnel ventilated trailer would improve bird wellbeing, avoid negative public perception, improve some environmental aspects of the chicken meat industry and have a financial benefit. The financial saving that would be gained by the company using the tunnel ventilated trailer is considered substantial. Transporting meat chickens on a tunnel ventilated trailer would minimise bird exposure to the environment. However it has been suggested that closed ventilated trailers may restrict ventilation too much and excessive heat and moisture levels may build up around the birds (Kettlewell et al., 1993). Further research into the interaction between season and environmental conditions within the tunnel ventilated trailer is required. A thorough review of the prevention of ventilation failure would be necessary before replacement of conventional trailers with tunnel ventilated trailers. Transporting meat chickens in a closed ventilated trailer removes the birds from public view. This would allow meat chickens to be transported during the day minimising negative public perception and would enable processing on arrival at the factory which would further decrease weight loss. There is also a potential environmental benefit of transporting meat chickens in a closed ventilated system because faecal matter and feathers can be retained within the trailer. This material can then be disposed of at an appropriate disposal facility.

The recommendation of introducing tunnel ventilated trailers may be incorporated into the management procedure in a number of ways. These methods may include: (1) total use of the tunnel ventilated trailer to transport the birds from the farm to the processing plant; the benefits would outweigh the negatives for this company because there are only three farms in SEQ closer than 40km to the processing plant; (2) using the tunnel ventilated trailer to transport birds from the farms further from the processing plant and maintaining some conventional trailers to transport birds from the farms closest to the processing plant. Should the conventional trailer continue to be used, the trailer should be driven at a speed as close as possible to 48km/h to minimise liveweight loss but still maintain adequate airflow.

V. ACKNOWLEDGEMENTS

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REFERENCES