

Effect of Environmental Factors on the Frequency of Fatigued Pigs and Mortality Rates at a Commercial Abattoir

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Summary and Implications

The objective of this study was to identify weather and transportation factors that increased the incidence of fatigued, injured, and deceased pigs per trailer load. A total of 14 variables including temperature-humidity index, density of trailer, and week of transport accounted for variation in percentage of defects per trailer.

Introduction

Fatigued and deceased pigs on arrival or in pens at commercial meat harvest plants decrease the profitability of both the producers and processors. These animals, termed pig defects, affect profitability by increasing trim loss in injured pigs and entire carcass loss in deceased pigs. Many environmental and management factors such as weather and transportation affect the incidence of pig defects. This study will evaluate the effects of weather on pig defects at a commercial abattoir.

Materials and Methods

Fatigued, injured, and deceased pigs on arrival and in waiting pens at a Midwest packing plant were counted per trailer load (N = 11,553 loads) from May 2005 to April 2006. Date, farm origination, trailer type, driver, normal or split load type, trailer loading crew, number of hogs, live weight, and pull from barn were recorded for each trailer load and used as fixed effects in models for the analysis of PDEFECTS (percentage of total defects per load).

Weather data were collected during the same period from a mobile weather station located at the packing facility. Wind direction, speed, and gust were utilized as fixed effects while temperature (°C), relative humidity, and dew point were used in the equation to calculate temperature-humidity index (THI; NOAA, 1976). Density was calculated by multiplying the average live weight by the number of pigs per load. Density, minutes of rest in pens at the packing plant, and load time per pig were used as linear covariates while THI was used as a quadratic covariate in PDEFECT analysis.

The analysis of PDEFECT utilized fixed and multiple regression techniques and was performed using GLIMMIX procedures of SAS. Non-significant ($P > 0.1$) fixed effects

or covariates were removed from the final model. The ILINK option was used to convert logarithmically-transformed means into their original units. Therefore, treatment medians instead of means will be listed in this paper.

Results and Discussion

In the final model, a total of 14 variables (9 fixed and 5 covariate) accounted for variation in the percentage of defects per trailer. Most notably, the covariate density accounted for the largest ($P < 0.0001$) percentage of variation (based on F value). The effect of density on percentage of defects per trailer is shown in Figure 1. As density increases in relation to trailer space (sq. ft.), percentage of defects per trailer increase. At the greatest pig density, producers could potentially attain 1% defects per load. Moreover, pig average live weight should be incorporated into equations to estimate number of hogs per trailer section.

The effect of temperature-humidity index on percentage of defects per trailer is shown in Figure 2. Both the linear and quadratic THI covariates were significant ($P < 0.0181$, $P < 0.0008$, respectively) sources of variation in the analysis of PDEFECT. The lowest percentage defects occurred between -11 and -6°C. Defects increase during conditions of extremes of THI however increase greater in hot or humid conditions.

As shown in Figure 3, percentage of defects per trailer fluctuates throughout the year. The greatest medians of defects occurred during the winter months of December through February whereas the lowest defects occurred June through August. Load crew personnel must take precautionary measures during winter months to limit the number of defects by utilizing deicers or proper bedding.

Although variables individually do not contribute large percentages of defects per trailer, a combination of variables can appreciatively cost producers money through the loss of marketable carcass weight.

Figure 1. Effect of density on percentage of defects per trailer.

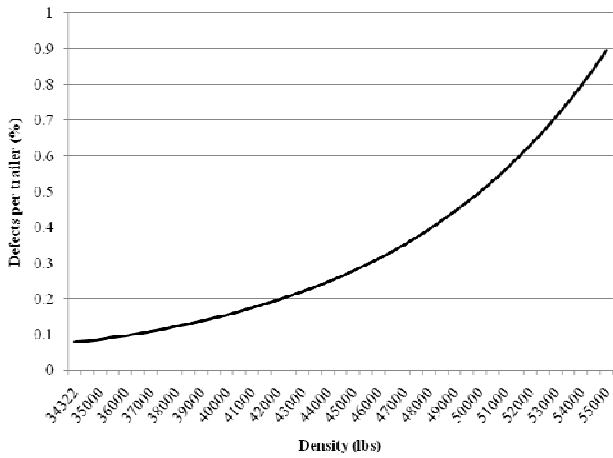


Figure 2. Effect of temperature-humidity index on percentage of defects per trailer.

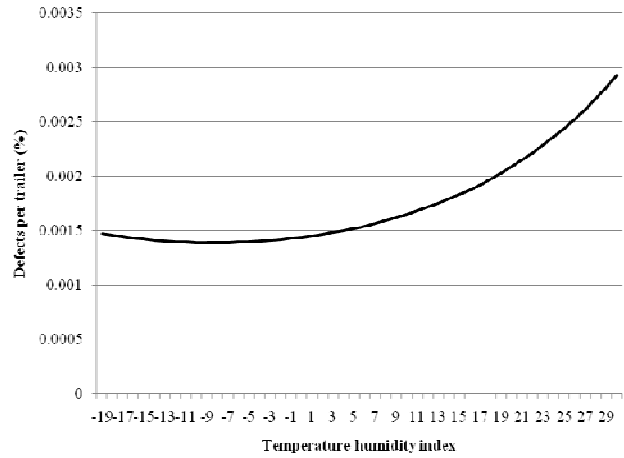


Figure 3. Effect of time of year on percentage of defects per trailer.

