

## **Effects of Foreign Material, LSK, and Fill Level on Drying Performance in Semi-Drying Trailers**

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Semi-trailer vans modified for drying farmers stock peanuts were introduced in West Texas between 1997 and 2000. These high-capacity drying trailers gained popularity throughout the peanut producing areas of the United States and are currently used to dry between 50 and 65% of the annual peanut crop. Little research has been published regarding the performance of these drying units. A study was conducted at a peanut buying facility where four high-capacity drying trailers were instrumented with 36 thermocouples each to monitor temperatures during drying. A vacuum was used to extract samples from the top, middle, and bottom of the load at nine locations in each trailer at the beginning and the end of each drying cycle. Foreign material, loose shelled kernel, and kernel moisture content was determined for each sample. Fill level of each trailer was calculated by dividing the weight peanut material delivered in the trailer by the capacity of the trailer. Initial and final moisture content averaged 14 and 9%, respectively. Average drying time for each load was  $8 \pm 5$  hours. On average, the trailers were filled to 75% capacity. The average foreign material was 7% with a standard deviation of 5%. Similarly, the LSK averaged  $8\% \pm 4\%$ . Neural network models were developed to predict the range in final moisture content and the drying time of a load of peanuts as a function of fill level, initial and final moisture content, percent foreign material, and percent loose shelled kernels. The average  $R^2$  for the 4-node neural network to predict drying time was 0.73 with an RSME of 2 hrs. The 2-node neural network model to predict the moisture range in a load of peanuts after drying had an  $R^2$  of 0.77 and an RSME of 0.5%.