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Abstract
Six hundred crossbred gilts and barrows were finished in hoop structures with a stocking density of either 7.5 ft^2 per pig or 12.0 ft^2 per pig. Performance and growth data including ADG, feed conversion (feed:gain), slaughter weight, shrink percentage during transport and lairage, dressing percentage, loin eye area, 10th rib backfat thickness, last rib fat depth, and fat free lean percentage were analyzed to determine effects of stocking density on growth and carcass traits. Increasing the stocking density from 12 to 7.5 ft^2 /pig in hoop structures did not affect growth performance, carcass composition, or fresh pork quality.

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Introduction

Six hundred crossbred gilts and barrows were finished in hoop structures with a stocking density of either 7.5 ft^2 per pig or 12.0 ft^2 per pig. Performance and growth data including ADG, feed conversion (feed:gain), slaughter weight, shrink percentage during transport and lairage, dressing percentage, loin eye area, 10th rib backfat thickness, last rib fat depth, and fat free lean percentage were analyzed to determine effects of stocking density on growth and carcass traits. Increasing the stocking density from 12 to 7.5 ft^2/pig in hoop structures did not affect growth performance, carcass composition, or fresh pork quality.

Hoop structures are large, tent-like shelters with cornstalks or straw for bedding. Growing interest in these alternative swine production systems has driven research interests to determine pig production strategies to maximize profit and performance potential for swine producers. Determining the effects of stocking density on growth and carcass performance within these systems will allow producers to adjust stocking rates to maintain optimum production standards. Currently, "normal" stocking rates for hoop structures range from 10–12 ft^2/pig.

Materials and Methods

Animal Selection. Six groups of 100 pigs were chosen in a completely randomized fashion and sorted in one of two groups: high (n = 50) with a stocking density of 7.5 ft^2/pig, or normal (n = 50) with a stocking density of 12.0 ft^2/pig. Pigs were allotted to ensure an equal representation of litters within groups. Diet, vaccinations, and herd management were standardized within all groups.

Performance and Carcass Measurements. Six gilts from each group were stratified by slaughter weight, and sorted into six weight range groups. One gilt from each weight range group was randomly chosen for sampling. Average daily gain, feed conversion, and slaughter weight were recorded. Groups were transported 126.8 miles to the Iowa State Meat Laboratory and held for harvest approximately 24 hours. Shrink percentage incurred during transportation and lairage was calculated. Dressing percentage, 10th rib backfat thickness, last rib fat thickness, loin eye area, and fat free lean percentage were recorded for each carcass. Fat free lean percentage was calculated using the National Pork Board fat free lean calculation. Pork loin color, pH, drip loss, and cooked pork star probe, an objective measurement designed to measure the force necessary to compress a pork chop, were measured according to standard protocols.

Statistical Analysis. Collected data was analyzed using the general linear models procedures of SAS (Cary, NC) to determine environmental effects on ADG, feed conversion, live weight, carcass weight, dressing percentage, loin eye area, 10th rib backfat thickness, last rib fat thickness, fat free lean percentage, and loin eye depth. The model included stocking density as the environmental determinant variable. Pairwise comparisons between means were done using Tukey's range test with an alpha = 0.05.

Results and Discussion

Comparisons of growth and carcass traits among environments are summarized in Table 1.

Finishing pigs in hoop buildings with an increased stocking density resulted in significantly higher dressing percentage (P<0.05), larger loin eye areas, and lighter (174.49 lb vs. 173.29 lb) carcass weights than normally stocked pigs (P<0.05). Carcass composition was not significantly influenced by stocking density used in this trial. The results indicate that stocking density did not have a significant effect on fresh pork color, drip loss, pH or texture.

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Table 1. Least squares means between high and normal density groups.

Variable	High Density	SEM*	Normal Density	SEM
Beginning weight (lb)	162.75	2.22	163.10	2.49
Live weight (lb)	233.91	3.64	235.17	3.34
Carcass weight (lb)	174.50	2.62	173.29	2.61
Dressing (%)	74.65[a]	0.28	73.66[b]	0.24
ADG (lb/day)	1.79	0.06	1.77	0.06
Feed conversion (lb feed:lb gain)	3.89	0.19	4.28	0.28
LEA (in.^{2})	6.93[a]	0.14	6.53[b]	0.12
10th rib backfat (in.)	0.54	0.02	0.52	0.02
Last rib fat depth (in.)	0.67	0.04	0.61	0.02
Fat free lean (%)	56.69	0.34	56.32	0.28

Means lacking similar superscript differ significantly (P<0.05).
*SEM is the standard error of the mean.

Table 2. Least squares means of pork quality traits in pork from high and normal density groups[a].

Variable	High Density	SEM[d]	Normal Density	SEM
Hunter L value[b]	54.43	0.395	54.54	0.532
Drip loss (%)	3.68	0.26	3.59	0.24
Ultimate pH	5.43	0.02	5.40	0.019
Star probe (kg)[c]	6.69	0.117	6.74	0.100
NPB marbling score	1.42	0.085	1.47	0.11

[a] No differences in any traits measured were detected.
[b] A higher L value indicates a lighter color.
[c] A higher star probe value indicates a less tender pork chop.
[d] SEM is standard error of the mean.