The Effects of Finishing Environment and Stocking Density on Growth and Carcass Traits in Swine

A.S. Leaflet R2032

B.S. Patton, Graduate Research Assistant
S.M. Lonergan, Associate Professor of Animal Science
M.S. Honeyman, Professor of Animal Science

Summary and Implications

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, 10^{th} 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 or carcass composition.

Introduction

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 effect of stocking density within these systems on growth and carcass performance will allow producers to adjust stocking rates to maintain optimum production standards. Currently, "normal" stocking rates for hoop structures range from 10 – 12 sq. ft/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 sq. ft^2/pig. Pigs were allotted to ensure equal representation of litter 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, 10^{th} 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. The remaining 44 gilts and barrows from each group were harvested at a commercial facility on the same day as pigs harvested at the ISU Meat Laboratory. Fat-O-Meater™ data was obtained from the commercial facility, providing individual carcass weights, backfat depth and loin eye depth measurements.

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, 10^{th} 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 between environments are summarized in tables 1 and 2. Finishing pigs in hoop buildings with an increased stocking density resulted in significantly ($P<0.05$) higher dressing percentage, larger loin eye areas and lighter (174.49 lbs. vs. 173.29 lbs.) carcass weights than normally stocked pigs ($P<0.05$)

Table 2 summarizes slaughter results from the commercially slaughtered pigs. Commercial results indicated pigs finished within a higher stocking density group had significantly ($P<0.05$) lower backfat and loin eye depth compared to pigs with normal stocking density. These results indicate negative effects of increasing stocking density in hoop buildings, but more research needs to be conducted to note sex effect, as sex class was not noted for each carcass in the commercial facility.

These data indicate that a slight increase in stocking density does not negatively influence growth performance or carcass composition.

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

Variable	High	SEM	Normal	SEM
Beginning Weight (lbs)	162.75	2.22	163.10	2.49
Live Weight (lbs)	233.91	3.64	235.17	3.34
Carcass Weight (lbs)	174.50	2.62	173.29	2.61
Dressing (%)	74.65[a]	0.28	73.66[b]	0.24
Shrink (%)	2.32	0.14	2.38	0.18
ADG (lbs/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
10^{th} rib Backfat (inches)	0.54	0.02	0.52	0.02
Last Rib Fat Depth (inches)	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)

Table 2. Least squares means between high and normal density groups – Commercial Harvest

Variable	High	SEM	Normal	SEM
Carcass Weight (lbs)	182.45	1.15	184.95	1.18
Backfat Depth(inches)	0.59[a]	0.20	0.62[b]	0.20
Loin Eye Depth (inches)	1.95[a]	0.42	2.00[b]	0.44
Fat Free Lean (%)	55.27	0.24	55.22	0.17

Means lacking similar superscript differ significantly (P<0.05)

Acknowledgements

This work was partially funded by a grant from the USDA Special Research Grants Program. The authors recognize the skillful technical assistance of Dan Johnson, Wayne Roush, Don Hummel, Zeb Sullivan, Pete Lammers and Arlie Penner that was so critical in completion of the project.