Lean and Fat Deposition Measurements for Purebred Berkshire Pigs Housed in Hoop Barns in Iowa

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Summary and Implications

Previous research on meat quality of pork has demonstrated that purebred Berkshires have advantages over most commodity based pork. Therefore a Certified Berkshire Pork program has developed and is a vital niche market in Iowa and the United States that provides economic opportunity for a growing number of producers. This research has also documented that Berkshires have a significantly poorer feed conversion than other breeds, thus raising their cost of production. Understanding how feed programs and growth rates affect lean and fat deposition rates is a critical aspect to these niche programs in order to maximize profitability and quality of the Berkshire pork products marketed. From these two trials there are differences between the two trials for both barrows and gilts that may not be accounted for by seasonal affects. Overall, barrows averaged an inch of backfat between 200 and 240 lb body weight whereas gilts approached this backfat depth between 260 and 300 lb. Lean deposition rates were different between barrows and gilts and between trials. This difference makes it critical when selecting animals for marketing and achieving consistency in meat quality within a marketing system. The differences between barrows and gilts indicate it may be more critical that each are fed differently than in commercial production systems.

Introduction

The niche marketing of Berkshire pigs continues to grow in Iowa and the United States as the demand for high quality pork increases through these market chains. As the number of producers increases to meet the demand for Berkshire pork concerns about maintaining profitability, consistency and quality are growing. There is little information available to characterize the lean and fat deposition within the Berkshire programs and consequently, no benchmarks exist for producers or marketing to establish guidelines for quality control of their products. This paper summarizes the first and second phases of the Berkshire growth trials conducted at the ISU Western Research Farm, Castana, Iowa. As Berkshires have a reputation of being fatter and less efficient in feed conversion, it is important that understanding how these animals deposit lean and fat as they reach market weight. This information is needed to better feed and market these animals within a certified Berkshire quality meat program. Also, characterizing how purebred Berkshire pigs grow in bedded hoop barns will enable more accurate feed formulation for meat quantity, quality and consistency.

Materials and Methods

This study was conducted at the Iowa State University Western Research Farm, Castana, IA. Two distinct trials, summer and winter, were conducted in order to include the environmental extremes of Iowa's climate. In each trial 36 Berkshire feeder pigs (18 gilts; 18 barrows) were purchased from the same genetic source and housed in bedded mini-hoop barns at the ISU Western Research Farm, Castana, IA.

Pigs were fed ad libitum utilizing a six phased feeding program of corn-soybean meal based diets that met or exceeded amino acid requirements. At 21-day intervals pigs were serially weighed and scanned for loin muscle area and 10^{th} rib back fat. The targeted weight range was from 50 to 270 pounds of live weight. Due to the wide variation in size and weight (BWt), pigs were allotted to pens by sex and weight (light, medium, and heavy) with six pigs per pens and two pens per hoop. Gilts and barrows of similar weights were housed in one of three mini hoops which were divided in two for 12 pigs per hoop. Individual scans were used in regression analyses by weight for backfat, loin eye area (LEA, in^2) and lean deposition rates. Ultrasonic percent lean was calculated by the equation:

%Lean = (0.833*gender – 16.498*Backfat + 5.425*LEA + 0.291*BWt-0.534) / BWt; (gender: barrows=1; gilts=2)

Results and Discussion

Table 1 summarizes the initial (90 lb group average) and final (270 lb) ultrasonic measurements for the two trials. In both trials gilts averaged less backfat than barrows (0.90 inches vs 1.26 inches); however there were differences between the two trials. There were small differences between initial LEA scans of barrows and gilts for both trials, but at the end of the trials the gilts' LEA measurements averaged larger (6.56 in^2) than barrows' LEAs (6.19 in^2). As expected Berkshire hogs are not as lean as commercial lines, but the relative difference between barrows and gilts in percent lean was consistent, with Berkshire gilts averaging 50.5% versus 46.2% for barrows. Figures 1, 2, and 3 depict backfat deposition, loin eye area and percent lean measurements by trial and gender of Berkshire pigs for start to end of test, respectively. Although the backfat intercepts were similar at 50 lb, the slopes were different between barrows and gilts and between trials (linear regressions). In comparison, quadratic

LEA regressions were almost identical between genders and trials from 50 to 300 lb. The calculated lean percentages differed between barrows and gilts, and also between trials. For the lean percent values the intercepts differed, however the slopes of each line were similar for barrows between trials as were the slopes for gilts when linearly regressed. Further investigation into the difference between the trials is warranted with more indepth statistical analysis will be conducted.

Acknowledgements

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Table 1. Live ultrasonic measurements and calculated percent lean of Berkshire pigs.

		Body weight, lb		Backfat,in		Loin Eye Area, in^2		Off-test %Lean***	
Trial	Wt-Sex*	Initial	Final	Initial	Final	Initial	Final	Live	Carcass**
1	Lt-G	41	262	0.31	1.04	1.97	6.12	35.6	48.2
	Lt-B	47	273	0.38	1.38	2.16	5.95	33.0	44.7
	Md-G	56	265	0.35	0.91	2.52	6.83	37.8	51.1
	Md-B	55	277	0.46	1.39	2.43	5.94	32.9	44.4
	Hy-G	66	273	0.41	1.01	2.85	6.68	36.9	49.9
	Hy-B	69	278	0.55	1.42	2.76	5.88	32.6	44.1
2	Lt-G	46	258	0.35	0.83	2.37	6.51	38.0	51.3
	Lt-B	43	270	0.36	1.12	2.24	6.59	36.0	48.6
	Md-G	52	261	0.31	0.72	2.53	6.60	38.7	52.3
	Md-B	53	278	0.41	1.13	2.62	6.50	35.6	48.1
	Hy-G	60	272	0.35	0.91	2.87	6.63	37.2	50.3
	Hy-B	64	271	0.43	1.14	3.22	6.28	35.1	47.5
1	G	54	267	0.36	0.99	2.44	6.54	36.8	49.7
	B	57	276	0.46	1.40	2.45	5.92	32.8	44.4
2	G	52	264	0.33	0.82	2.59	6.58	38.0	51.3
	B	53	273	0.40	1.13	2.69	6.46	35.6	48.0
Overall	Trial 1	56	271	0.41	1.19	2.45	6.23	34.8	47.1
	Trial 2	53	268	0.37	0.97	2.64	6.52	36.8	49.7
	Gilts	53	265	0.34	0.90	2.52	6.56	37.4	50.5
	Barrows	55	275	0.43	1.26	2.57	6.19	34.2	46.2
	All pigs	54	270	0.39	1.08	2.54	6.38	35.8	48.4

* Lt= light, Md= medium, Hy = heavy weight; G = gilts; B = barrows;

** Carcass percent lean estimated at 74% of the off-test live calculation

*** %Lean = (0.833*gender - 16.498*Backfat + 5.425*LEA + 0.291*BWt-0.534) / BWt

Figure 1.

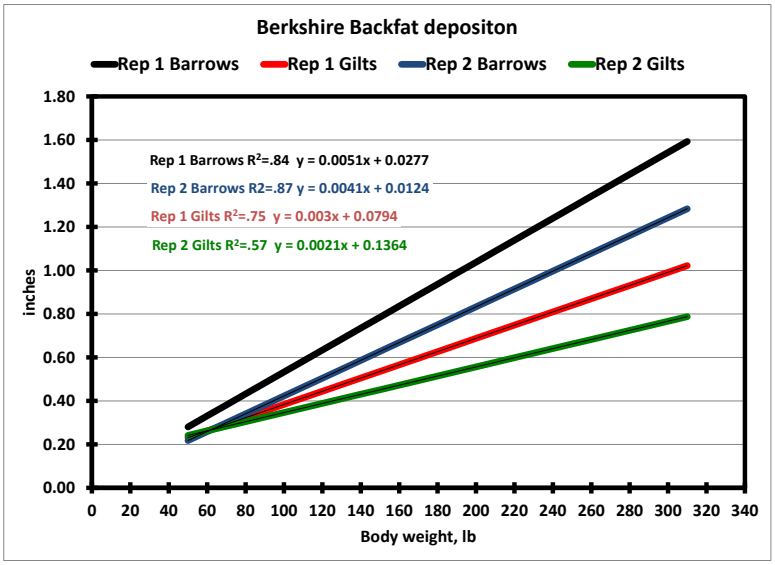

Figure 2.

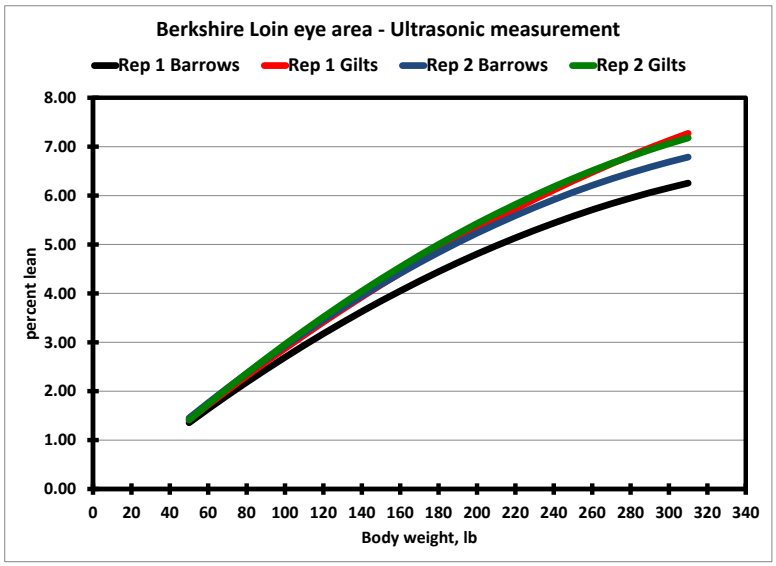

Figure 3.