

Growth, Carcass and Meat Quality Trait Performance of Pure Breeds

National Swine Improvement Federation 2004
Annual Meeting
R. N. Goodwin

National Barrow Show Progeny Tests

Joint venture of

- Hormel Foods, Austin, MN
- National Pork Producers Council
- National Pork Board
- National Association of Swine Records
- Iowa State University
- University of Minnesota
- Minnesota Pork Producers Association

NBS Progeny Tests

Started Spring 1991

- 15 test groups 1991-2004
- 6024 pigs
- 259 breeders from 22 states

NBS Progeny Tests

- 8 pigs representing at least 3 litters
- barrows or gilts
- 3-generation pedigree
- 40-65 lbs at entry wt
- 70 lb starting wt
- 243 lb market weight

Distribution of breeds, sires, dams, HAL-1843 genotypes and RN* genotypes

Breed	Sires	Dams	Pigs	NN	Nn	nn	RN- /RN-	RN-/rn+	rn+/rn+
Berkshire	191	650	1504	1426	75	3	0	60	1234
Chester White	74	271	556	545	11	0	0	12	397
Duroc	132	491	985	961	24	0	0	2	568
Hampshire	66	237	472	448	24	0	49	60	29
Landrace	73	250	574	536	36	2	0	2	275
Poland China	56	206	429	211	186	32	0	22	223
Spot	46	159	328	247	74	7	0	12	92
Yorkshire	127	456	923	889	34	0	0	6	377
Total	765	2720	5771	5263	464	44	49	176	3195

Mixed Statistical Models

Trait

All	Random effects of sire, dam, herd of origin
ADG, STRUC, MOVE	Fixed effects of test group, breed, sex, breed by sex interaction, HAL, and ONWT
YIELD, LENGTH, BF10, LBRF, LLBF, LMA	Fixed effects of test group, breed, sex, breed by sex interaction, HAL, and OFFWT
PH, IMF, MINOLTA, HUNTER, CLOSS, JUICY, TENDER, INSTRON	Fixed effects of OFFDATE, BREED, SEX, breed by sex interaction, HAL, and RN

Breed differences for ADG, MOVE and STRUC

Breed	ADG, lb/d	SE	MOVE	SE	STRUC	SE
Berkshire	1.74 bc	.013	3.17 d	.032	3.22 d	.037
Chester White	1.71 cd	.019	3.63 a	.045	3.62 a	.048
Duroc	1.79 a	.014	3.55 a	.035	3.55 ab	.037
Hampshire	1.68 d	.018	3.34 c	.045	3.34 c	.048
Landrace	1.79 a	.017	3.23 d	.043	3.22 d	.046
Poland China	1.77ab	.022	3.21 d	.053	3.30 cd	.055
Spot	1.71 cd	.022	3.36 c	.055	3.46 bc	.058
Yorkshire	1.76 ab	.014	3.47 b	.035	3.37 c	.037

Breed differences for YIELD, LENGTH and LMA

Breed	YIELD,%	SE	LENGTH, in	SE	LMA, sq in	SE
Berkshire	72.8 d	.11	31.9 cd	.05	5.53 e	.055
Chester White	73.4 ab	.16	31.8 d	.07	5.75 d	.077
Duroc	72.4 e	.12	32.0 c	.05	6.12 bc	.057
Hampshire	73.0 cd	.15	31.9 cd	.07	6.56 a	.072
Landrace	73.2 bc	.14	32.8 a	.07	6.03 bc	.068
Poland China	72.6 de	.18	31.9 cd	.09	5.74 d	.092
Spot	73.4 ab	.16	31.9 cd	.09	5.95 cd	.091
Yorkshire	73.6 a	.12	32.5 b	.05	6.17 b	.056

Breed differences for BF10, LRBF and LLBF

Breed	BF10, in	SE	LRBF, in	SE	LLBF, in	SE
Berkshire	1.13 d	.015	1.17 b	.012	1.24 c	.015
Chester White	1.13 d	.021	1.14 b	.017	1.25 c	.022
Duroc	0.90 b	.016	1.03 a	.013	0.98 a	.016
Hampshire	0.85 a	.020	1.06 a	.017	1.03 b	.020
Landrace	0.93 b	.019	1.02 a	.016	1.07 b	.019
Poland China	1.08 cd	.025	1.14 b	.020	1.29 d	.026
Spot	1.02 c	.025	1.14 b	.017	1.21 c	.022
Yorkshire	0.90 b	.016	1.03 a	.013	1.05 .b	.016

Breed differences for IMF, PH, MINOLTA and HUNTER

Breed	IMF,%	SE	PH	SE	MINOLTA	SE	HUNTER	SE
Berkshire	2.51 b	.067	5.68 a	.013	25.0 a	.25	49.8 a	.24
Chester White	2.39 bc	.091	5.70 a	.018	26.4 b	.33	51.3 b	.32
Duroc	3.07 a	.081	5.58 b	.015	26.7 b	.30	51.6 b	.30
Hampshire	2.09 de	.125	5.58 b	.023	24.2 a	.45	49.0 a	.44
Landrace	1.90 e	.101	5.47 c	.018	29.4 d	.36	54.2 d	.36
Poland China	2.18 cd	.105	5.61 b	.021	26.1 b	.37	50.9 b	.36
Spot	2.37 bc	.148	5.55 b	.029	27.0 b	.52	51.9 b	.51
Yorkshire	1.70 f	.091	5.47 c	.017	28.6 c	.33	53.4 c	.33

Breed differences for CLOSS, JUICY, TENDER and INSTRON

Breed	CLOSS,%	SE	JUICY	SE	TENDER	SE	INSTRON,kg	SE
Berkshire	20.8 a	.27	6.1 a	.10	7.3 a	.12	5.09 a	.070
Chester White	22.2 b	.35	5.8 b	.12	6.6 bc	.15	5.58 bc	.095
Duroc	23.4 cd	.32	5.4 c	.12	6.3 cd	.14	5.77 cd	.083
Hampshire	22.9 bc	.46	5.8 ab	.17	6.8 b	.20	5.67 bc	.122
Landrace	24.0 d	.38	5.0 d	.14	6.6 bc	.17	5.43 b	.098
Poland China	22.3 b	.38	5.4 c	.14	6.3 cd	.17	5.86 d	.112
Spot	22.9 bc	.54	5.3 cd	.20	5.9 d	.25	5.75 cd	.152
Yorkshire	23.8 cd	.35	4.9 d	.13	6.3 cd	.15	5.78 cd	.091

Breed differences of NBS meat quality traits estimated from 1991-1994. Least squares means and standard errors

BREED	MINOLTA, %	PH, pH	IMF, %
Berkshire	21.2 ^d ±.46	5.92 ^a ±.02	3.09 ^b ±.11
Duroc	22.2 ^{cd} ±.56	5.72 ^b ±.03	4.06 ^a ±.14
Hampshire	22.7 ^c ±.52	5.53 ^d ±.02	2.52 ^c ±.13
Landrace	27.8 ^a ±.61	5.65 ^c ±.03	2.42 ^c ±.16
Poland China	23.7 ^{bc} ±.48	5.72 ^b ±.02	2.98 ^b ±.12
Spot	25.0 ^b ±.45	5.69 ^{bc} ±.02	2.91 ^b ±.11
Yorkshire	24.6 ^b ±.50	5.72 ^b ±.02	2.32 ^c ±.13

Means with the same superscript are not statistically different (P < .05).

Breed differences of *longissimus dorsi* eating quality traits estimated from 1991-1994 NBS. Least squares means and standard errors.

BREED	INSTRON, kg	CLOSS, %	JUICY (1-5)	TENDER (1-5)
Berkshire	5.87 ^a ±.11	24.0 ±.64	3.1 ±.08	3.4 ^a ±.07
Duroc	6.23 ^b ±.14	25.3 ±.78	3.2 ±.10	3.2 ^b ±.08
Hampshire	6.21 ^b ±.13	27.0 ±.73	3.3 ±.09	3.4 ^a ±.08
Landrace	6.43 ^{bc} ±.16	26.0 ±.89	3.0 ±.11	3.0 ^b ±.10
Poland China	6.53 ^{bc} ±.12	23.8 ±.67	3.2 ±.09	3.0 ^b ±.07
Spot	6.57 ^c ±.11	25.5 ±.63	3.0 ±.08	3.0 ^b ±.07
Yorkshire	6.40 ^b ±.12	24.7 ±.70	2.9 ±.09	3.1 ^b ±.08

Means with the same superscript are not statistically different (P < .05).

Breed by Sex differences for BF10 and IMF

Breed	BF10, in Barrow	SE	BF10, in Gilt	SE	IMF, % Barrow	SE	IMF, % Gilt	SE
Berkshire	1.28	.015	0.98	.016	2.90	.070	2.13	.072
Chester White	1.27	.022	0.99	.023	2.82	.098	1.96	.103
Duroc	1.00	.017	0.80	.017	3.34	.091	2.80	.088
Hampshire	0.93	.021	0.77	.023	2.28	.141	1.91	.146
Landrace	1.03	.021	0.84	.022	2.04	.112	1.77	.113
Poland China	1.19	.027	0.97	.027	2.36	.117	1.99	.121
Spot	1.13	.027	0.91	.028	2.66	.167	2.08	.173
Yorkshire	1.01	.017	0.79	.018	1.91	.097	1.50	.107

Sex differences for all traits

Trait, units	Barrow	SE	Gilt	SE	Barrow-Gilt Difference
ADG, lb/d	1.82	.008	1.67	.008	0.15
MOVE	3.33	.021	3.41	.022	-0.08
STRUC	3.34	.022	3.43	.023	-0.09
YIELD, %	72.7	.08	73.2	.08	-0.5
LENGTH,in	31.8	.03	32.3	.03	-0.5
LMA, sq in	5.66	.034	6.30	.035	-0.64
BF10, in	1.10	.009	0.88	.010	0.22
LRBF, in	1.16	.008	1.02	.008	0.14
LLBF, in	1.21	.010	1.07	.010	0.14
IMF, %	2.54	.056	2.02	.058	0.52
PH	5.59	.011	5.57	.011	0.02
MINOLTA	26.9	.21	26.5	.22	0.4
HUNTER	51.7	.21	51.3	.22	0.4
CLOSS, %	22.9		22.1		ns
JUCY	5.6	.09	5.4	.09	0.2
TENDER	6.5		6.5		ns
INSTRON,kg	5.49	.059	5.75	.061	-0.26

Differences due to HAL and RN genotypes

Trait, units	HAL, normal	SE	HAL, monomutant	SE	RN, normal	SE	RN, mono or dimutant	SE
ADG, lb/d	1.74		1.74					
MOVE	3.38		3.36					
STRUC	3.41		3.36					
YIELD, %	72.7	.06	73.2	.11				
LENGTH,in	32.1		32.0					
LMA,sq in	5.82	.029	6.15	.046				
BF10, in	1.03	.008	0.96	.013				
LRBF, in	1.10		1.08					
LLBF, in	1.15		1.13					
IMF, %	2.37	.046	2.19	.078	2.40	.047	2.16	.081
PH	5.60	.009	5.56	.015	5.67	.009	5.49	.015
MINOLTA	25.6	.17	27.7	.30	26.1	.17	27.3	.32
HUNTER	50.5	.17	52.5	.30	50.9	.17	52.2	.31
CLOSS, %	22.1	.19	23.5	.34	21.4	.19	24.2	.35
JUICY	5.8	.07	5.1	.13	5.3	.07	5.6	.13
TENDER	6.9	.08	6.1	.14	6.2	.08	6.8	.15
INSTRON,kg	5.42	.049	5.81	.082	5.74	.050	5.50	.085

Conclusions

Pork producers can choose between export markets, premium food service markets and commodity (maximum lean) markets.

Genetic differences are available to meet the needs of target markets.