Training Manual

for

USDA Standards for Grading Slaughter Animals

By:
Terry G. Harris, OIC
Federal-State Livestock Market News
And Grading Service
Thomasville, Georgia 31799
229-226-1641

Based on Fred L. Williams, Jr.'s
A Notebook of Ramblings about Livestock Evaluation and Grading
by Fred L. Williams, Jr. (1991)

Edited by
Georgia Agriculture Education Curriculum Office
216 Four Towers
The University of Georgia
Athens, Georgia 30602

July 2002

SLAUGHTER HOG GRADING

The first thing a grader must do is determine whether, or not, a slaughter barrow or gilt has acceptable belly thickness, lean quality, or fat firmness. Those that do not are U.S. Utility, those that do must be graded U.S. 1, 2, 3, or 4 (fig. 5A). The truth, is, these factors are rarely seen in the live animal. A barrow or gilt must have bellies at least .6 inches thick.

Once you have made the above decision that the hog qualifies for one of the numerical grades (US 1, 2, 3, 4), the most important thing you have to do is get a handle on the amount of fat over the last rib. You should be aware at this point that, even though discussions usually center around the amount of fat at the last rib, the amount of fat used in determining the grade on hogs whose fat measurement at the last rib does not adequately reflect the actual amount of fat over the entire carcass, an adjusted fat thickness is used. Generally, in live animal grading, this will not surface, however, periodically you will come across a hog with unusual fat deposition and you will want to adjust the last rib fat estimate.

Once you have determined the fat estimate at the last rib you must convert this to a preliminary grade (just like yield grading cattle). In fact, the grades for slaughter barrows and gilts are yield grades. This conversion of fat thickness to preliminary grade in hogs is a rather simple one: less than 1.0 inches is a US 1, 1.0 to 1.24 inches is a US 2, 1.25-1.49 inches is a US 3, and 1.5 inches and over is a US 4. After this, all you need to do is decide whether the hog has thick, average, or thin muscling. If it is thick, you must improve the grade one full grade; if it is average, the preliminary grade becomes the final grade; if it is thin, you lower the preliminary grade one full grade. I said at the start it was pretty simple.

There is another way to determine the grade that we use at correlations. I prefer it because it gives the grade of the slaughter hog in tenths of a grade. First, determine the degree of muscling and assign the following numerical factor: thick = 3, average = 2, thin = 1. Next, determine the fat thickness at the last rib. Now, multiply the fat thickness by 4.0 and then subtract the numerical factor for muscling [(4.0 X backfat thickness at the last rib) – (1.0 X muscling score)]. That is all there is to it. You will soon see that your communication while correlating is much improved when using this method.

There are a couple of situations you need to keep in mind when grading hogs in addition to the above information:

1) Hogs with 1.75 or more inches at the last rib must remain a US 4 regardless of how thick their muscling might be.
2) Hogs with thin muscling cannot qualify for the US 1 grade.

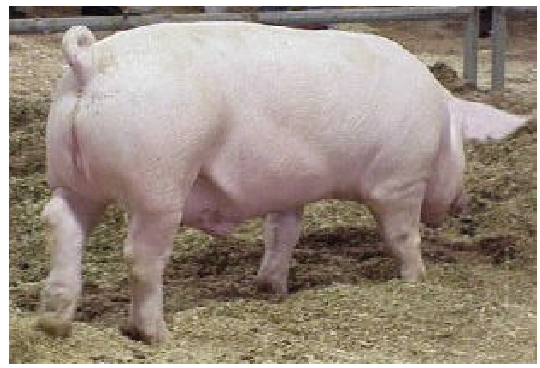
The evaluation of muscling in hogs is very much like cattle. In fact, you can take most any description of muscling evaluation on cattle, scratch out the reference to cattle and insert hogs, and go on. In fact, some of the things talked about are actually easier to perceive on hogs than they are on some other species of livestock – I guess because of the rather smooth, close hair coat on hogs rarely mask the contour of the skin and what lays under it. One of the things that sticks in my mind as being rather common in hogs is the view from the rear that looks like an infant with low slung diapers that has had an accident. Do you remember what that look tells you? If you said "fat", you were right. So, do not let a look like that confuse your evaluation of muscle thickness. In this case, some, if in fact not most, of its thickness is due to fat – not muscle. Another view down over the top. Remember, when an animal is wider through the shoulders and hams than through the loin (often referred to as the "hour glass effect"), the animal is not carrying excessive fat. This expression is rather easily observed and evaluated in hogs.

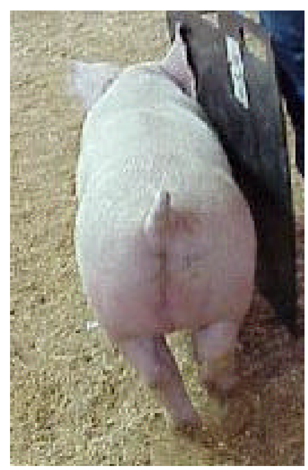
A) USDA Pork Grades

i) US #1
ii) US #2
iii) US #3
iv) US #4
v) Utility

U.S. No. 1

U.S. No. 2





U.S. No. 3

U.S. No. 4

B) Regression Equation

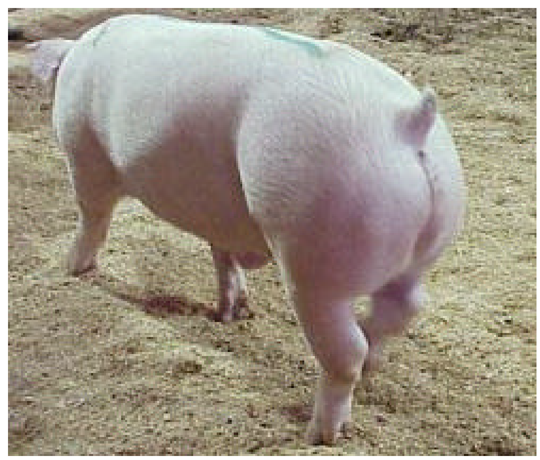
A wave of change has come over slaughter hog grading in the past couple of years. Some of it is due to the change in the hog industry as a whole. However, some of it is just the simple fact that the U.S. grade standards for slaughter hogs don't do a very good job segregating hogs or keeping up with industry changes. As a result, the Des Moines, IA and Thomasville, GA offices have worked diligently on the development of a grid that expresses lean yields.

Lean yields associated with backfat, thickness, and loin eye area, as measured 7cm from the midline between the 3rd and 4th rib from the last. Many packers have a value based marketing system where producers are paid based on some measure of the lean yield their pigs produce. Typically the end point is either a lean meat yield or a composite cutout value carcass price. Currently, more than 50% of the pork population falls into the U.S No. 1 category. With such a large percentage of hogs in the No. 1 category significant differences in lean yields exist within that grade. Furthermore, the impact muscle has on lean yield is magnified as fat content diminishes.

The Regression Equation used to develop the following grid expressing lean yield comparisons to backfat thicknesses and loin eye area:

58.86 – (.61 x BF) + (.12 x LD)

Back Fat = .6 inches
Muscling = Thick
Loin Eye Area = 8.0 sq. inches
USDA Grade = 1
Percent Lean = 57.87%



Back Fat = .75
Muscling = Avg. +
Loin Eye Area = 7.2 sq. inches
USDA Grade = 1
Percent Lean = 55.69%

Back Fat = 1.3
Muscling = Avg.
Loin Eye Area = 6.1 sq. inches
USDA Grade = 3
Percent Lean =46.07%

Back Fat = 1.1
Muscling = Avg.+
Loin Eye Area = 6 sq. inches
USDA Grade = 2
Percent Lean = 47.9%

Back Fat = 1.4
Muscling = Avg.
Loin Eye Area = 6.0 sq. inches
USDA Grade = 3
Percent Lean = 43.63%

Back Fat = 1.6 inches
Muscling = Thin
Loin Eye Area = 5.0 sq. inches
USDA Grade = 4
Percent Lean = 38.89%

C) Charts

i) Lean Yields Associated with Backfat Thickness and Loineye Area at the 10th Rib Measurement

		Thin		Average			Thick			
Loin Depth (mm)		38	42	47	51	55	60	64	68	72
L.E.A. (Sq In)		4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5
Backfat (in.)	(mm)									
.28	7	59.15	59.63	60.23	60.71	61.19	61.79	62.27	62.75	63.23
.32	8	58.54	59.02	59.62	60.10	60.58	61.18	61.66	62.14	62.62
.35	9	57.93	58.41	59.01	59.49	59.97	60.57	61.05	61.53	62.01
.39	10	57.32	57.80	58.40	58.88	59.36	59.96	60.44	60.92	61.40
.43	11	56.71	57.19	57.79	58.27	58.75	59.35	59.83	60.31	60.79
.47	12	56.10	56.58	57.18	57.66	58.14	58.74	59.22	59.70	60.18
.51	13	55.49	55.97	56.57	57.05	57.53	58.13	58.61	59.09	59.57
.55	14	54.88	55.36	55.96	56.44	56.92	57.52	58.00	58.48	58.96
.59	15	54.27	54.75	55.35	55.83	56.31	56.91	57.39	57.87	58.35
.63	16	53.66	54.14	54.74	55.22	55.70	56.30	56.78	57.26	57.74
.67	17	53.05	53.53	54.13	54.61	55.09	55.69	56.17	56.65	57.13
.71	18	52.44	52.92	53.52	54.00	54.48	55.08	55.56	56.04	56.52
.74	19	51.83	52.31	52.91	53.39	53.87	54.47	54.95	55.43	55.91
.79	20	51.22	51.70	52.30	52.78	53.26	53.86	54.34	54.82	55.30
.83	21	50.61	51.09	51.69	52.17	52.65	53.25	53.73	54.21	54.69
.87	22	50.00	50.48	51.08	51.56	52.04	52.64	53.12	53.60	54.08
.91	23	49.39	49.87	50.47	50.95	51.43	52.03	52.51	52.99	53.47
.94	24	48.78	49.26	49.86	50.34	50.82	51.42	51.90	52.38	52.86
.98	25	48.17	48.65	49.25	49.73	50.21	50.81	51.29	51.77	52.25
1.02	26	47.56	48.04	48.64	49.12	49.60	50.20	50.68	51.16	51.64
1.06	27	46.95	47.43	48.03	48.51	48.99	49.59	50.07	50.55	51.03
1.10	28	46.34	46.82	47.42	47.90	48.38	48.98	49.46	49.94	50.42
1.14	29	45.73	46.21	46.81	47.29	47.77	48.37	48.85	49.33	49.81
1.18	30	45.12	45.60	46.20	46.68	47.16	47.76	48.24	48.72	49.20
1.22	31	44.51	44.99	45.59	46.07	46.55	47.15	47.63	48.11	48.59
1.26	32	43.90	44.38	44.98	45.46	45.94	46.54	47.02	47.50	47.98
1.30	33	43.29	43.77	44.37	44.85	45.33	45.93	46.41	46.89	47.37
1.34	34	42.68	43.16	43.7	44.24	44.72	45.32	45.80	46.28	46.76
1.38	35	42.07	42.55	43.15	43.63	44.11	44.71	45.19	45.67	46.15
1.42	36	41.46	41.94	42.54	43.02	43.50	44.10	44.58	45.06	45.64
1.46	37	40.85	41.33	41.93	42.41	42.89	43.49	43.97	44.45	44.93
1.50	38	40.24	40.72	41.32	41.81	42.28	42.88	43.36	43.84	44.32
1.54	39	39.63	40.11	40.71	41.19	41.65	42.27	42.75	43.23	43.71
1.57	40	39.02	39.50	40.10	40.58	41.06	41.66	42.14	42.62	43.10
1.61	41	38.41	38.89	39.49	39.97	40.45	41.05	41.53	42.01	42.49
1.65	42	37.80	38.28	38.88	39.36	39.84	40.44	40.92	41.40	41.88
1.69	43	37.19	37.67	38.27	38.75	39.23	39.83	40.31	40.79	41.27
1.73	44	36.58	37.06	37.66	38.14	38.62	39.22	39.70	40.18	40.66
1.77	45	35.97	36.45	37.05	37.53	38.01	38.61	39.09	39.57	40.05
1.81	46	35.36	35.84	36.44	36.92	37.40	38.00	38.48	38.96	39.44

1.85	47	34.75	35.23	35.83	36.31	36.79	37.39	37.87	38.35	38.83
1.89	48	34.14	34.62	35.22	35.70	36.18	36.78	37.26	37.74	38.22
1.93	49	33.53	34.0	34.61	35.09	35.57	36.17	36.65	37.13	37.61
1.97	50	32.92	33.40	34.00	34.48	34.96	35.56	36.04	36.52	37.00

ii) Millimeter Backfat Conversion to Backfat Inches at 10th Rib

MIL	10th Rib B.F. IN	MIL	10th Rib B.F. IN	MIL	10th Rib B.F. IN
7	.28	19	.75	31	1.22
8	.32	20	.79	32	1.26
9	.35	21	.83	33	1.30
10	.39	22	.87	34	1.34
11	.43	23	.91	35	1.38
12	.47	24	.94	36	1.42
13	.51	25	.98	37	1.46
14	.55	26	1.02	38	1.50
15	.60	27	1.06	39	1.54
16	.65	28	1.10	40	1.57
17	.67	29	1.15	41	1.61
18	.71	30	1.18	42	1.65

iii) Loin Depth-Millimeter-Conversion to Approximate Square Inches L.E.A.

LD(In)	MIL	LEA(In)	LD(In)	MIL	LEA(In)	LD(In)	MIL	LEA(In)
3.66	93	11.05						
3.62	92	10.93	2.79	71	8.41	1.96	50	5.89
3.58	91	10.81	2.75	70	8.29	1.92	49	5.77
3.54	90	10.69	2.71	69	8.17	1.88	48	5.65
3.50	89	10.57	2.67	68	8.05	1.85	47	5.53
3.46	88	10.45	2.63	67	7.93	1.81	46	5.41
3.42	87	10.33	2.59	66	7.81	1.77	45	5.29
3.38	86	10.21	2.55	65	7.69	1.73	44	5.17
3.34	85	10.09	2.51	64	7.57	1.69	43	5.05
3.30	84	9.97	2.48	63	7.45	1.65	42	4.93
3.26	83	9.85	2.44	62	7.33	1.61	41	4.81
3.22	82	9.73	2.40	61	7.21	1.57	40	4.69
3.18	81	9.61	2.36	60	7.09	1.53	39	4.57
3.14	80	9.49	2.32	59	6.97	1.49	38	4.45
3.11	79	9.37	2.28	58	6.85	1.45	37	4.33
3.07	78	9.25	2.24	57	6.73	1.41	36	4.21
3.03	77	9.13	2.20	56	6.61	1.37	35	4.09
2.99	76	9.01	2.16	55	6.49	1.33	34	3.97
2.95	75	8.89	2.12	54	6.37	1.29	33	3.85
2.91	74	8.77	2.08	53	6.25	1.25	32	3.73
2.87	73	8.65	2.04	52	6.13	1.22	31	3.6
2.83	72	8.53	2.00	51	6.01	1.18	30	3.49