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Commercial cut-out and carcase composition of pigs killed at 200 lb. and 260 lb. liveweight.

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The results discussed in this paper are taken from a series of experiments the object of which was to investigate the efficiency of lean meat production from pigs killed at different liveweights.

Experimental layout.

In each of the experiments reported there were two treatments - bacon pigs killed at 200 lb. liveweight and manufacturing pigs killed at 260 lb. liveweight. There were 24 Large White pigs in each experiment representing two hogs and two gilts from each of six litters. One animal of each sex was allocated at random to each treatment. During the course of the experiments one bacon pig died and missing plot values were calculated for this pig when the results were statistically analysed.

The pigs were individually fed from weaning to slaughter. The manufacturing pigs were fed on a more liberal scale than the bacon pigs. Up to 140 lb. livewight all pigs received the same weaner ration which contained 20% crude protein. From 140 lb. liveweight to slaughter the bacon pigs received a 16% crude protein ration while the manufacturing pigs received a 14% crude protein ration.

Carcase Dissection Procedure.

Experiment 1

After slaughter and chilling for 48 hours the right side from each carcase of both bacon weight and manufacturing weight pigs was cut as for the manufacturing trade. The one factory butcher cut and trimmed all the pigs. He was instructed to cut the bacon pigs just as he did the manufacture pigs. The hams were skinned, boned and fat trimmed for canned ham production. The backs were boned, skinned and fat trimmed for the prepacked rasher trade. The bellies or streaks were not skinned. The shoulders were skinned, cut into butt, picnic and neck and boned and defatted. Skinning and trimming of the meat from the bones was done according to factory practice.

The left side from each carcase after chilling from three to six days was taken to the laboratory trimmed by removing feet, tail, kidney and kidney fat, cheek and head. The side was then cut into the four joints, leg, shoulder, back and belly.

The subcutaneous fatty tissue together with skin was then removed from each joint followed by the careful removal of the skin from the fatty tissue. The joint was then boned and the bone carefully cleaned. Both the subcutaneous fatty tissue and the boneless meat were each sampled for proximate analysis. Dissection, sampling of meat and fatty tissue and proximate analysis were, with the exception of the line of removal of back from belly, those as described by Hill and O'Carroll*. These methods are given in the appendix.

*F. Hill and F. M. O'Carroll, Irish Journal of Agricultural Research, Vol. 1. No. 2. 1962.

Experiment II.

The dissection procedure in experiment two was the same as that in experiment one except that only one side of the carcase was used for both factory cut-out and laboratory dissection. This meant that the factory cut-out was based on first jointing the carcase into leg, shoulder back and belly as described in the appendix and then following factory procedure as described for experiment I. Using the same side it was then possible to prepare it to achieve the same laboratory dissection as described for experiment I.

Definition of terms used.

Carcase: Pig with intestines and lungs, heart, liver and spleen removed. It includes spinal column.

Side: The half carcase with feet, tail, head, cheek, kidney and kidney fat removed.

Meat: Cut or side which has skin and bone removed.

Fat: Petroleum ether extract (40 - 60°C boiling point).

Protein: Nitrogen x 6.25.

Lean: Cut or side with skin, bone and fat removed. It is the sum of the protein, moisture and ash in the meat and includes that contributed by subcutaneous, inter- and intra-muscular fatty tissue.

Results.

In the first experiment the average carcase weight of the bacon pigs was 67.4 kilograms while that of the manufacturing pigs was 90.0 kilograms. In the second experiment the weights were 68.4 kilograms and 92.8 kilograms respectively.

The factory cut-out results are given for both experiments in table I and are expressed as percent of carcase weight.

The overall picture from these results for both experiments indicates that there is just over six percent of carcase weight more fat in the manufacturing pigs than in the bacon pigs and two to four percent more lean cuts and two to three percent more head, bone and skin in the bacon pigs than in the manufacturing pigs. There is a higher percentage of the expensive cuts ham and back in the bacon pigs than in the manufacturing ones.

The results for the composition of the sides are given in table II. As in the factory results they show fat as a higher percentage of side weight in the manufacturing pigs than in the bacon pigs. The difference is seven to ten percent. The bacon pigs have five to seven percent more of the carcase as lean than have the manufacturing pigs.

The distribution of skin, bone, fat and lean in the sides is also given in table II. The results computed in this way indicate if there is a difference in shape between the animals on the two treatments. The four sets of data show few significant differences. The heavy pigs carry a higher proportion of their total fat on the back than the bacon pigs while there is an indication that the bacon pigs carry a higher proportion of the total fat on the belly. The data for lean gives an indication of a slightly higher percentage of the total lean occurring in the shoulder of the bacon pigs compared with the manufacturing pigs. While in experiment I there is over two percent more of the total lean, in the backs of the manufacturing pigs than in the backs of the bacon pigs, this does not hold good for experiment II.

Conclusion

The results of both factory cut-out and careful laboratory dissection show that for these Large White pigs fed under the conditions described the most noteworthy difference between the pigs killed at bacon weight and at manufacturing weight was the high fat content of the manufacturing weight pigs. The carcase characteristics measured in these experiments do not suggest that there is any advantage in increasing the killing weight of pigs for manufacture from 200 lb. (91 kilograms) to 260 lb. (118 kilograms).

Factory cut-out of Bacon and Manufacturing Weight Pigs

		EXPERIMENT 1.				EXPERIMENT 11.			
		Bacon Pigs	Manuf-acturing Pigs	Standard Error	F Test	Bacon Pigs	Manuf-acturing Pigs	Standard Error	F. Test
Ham	Carcass %	17.90	16.42	0.26	**	16.44	15.09	0.33	*
Back	"	15.54	15.07	0.24	N.S.	13.86	13.06	0.22	*
Fillet	"	0.97	0.82	0.04	*	1.20	1.02	0.06	*
Steak	"	10.16	10.76	0.31	N.S.	9.49	9.32	0.20	N.S.
Butt	"	9.13	9.79	0.17	*	7.53	7.10	0.13	*
Picnic	"	6.98	6.12	0.34	N.S.	10.76	10.02	0.17	*
Neck	"	2.24	2.11	0.16	N.S.	3.10	2.91	0.16	N.S.
Meat Trimmings	"	1.76	1.30	0.19	N.S.	4.50	4.43		
Kidney	"	0.28	0.24	0.013	N.S.	0.35	0.32	0.01	N.S.
Kidney Fat	"	2.20	3.03	0.15	**	2.64	3.24	0.13	*
Fat	"	8.51	13.16	0.45	***	5.44	11.12	0.72	***
Head	"	6.96	6.20	0.07	***	7.48	6.97	0.18	N.S.
Feet	"	2.64	2.20	0.04	***	2.67	2.30	0.05	***
Bone	"	9.08	7.65	0.12	***	9.25	8.15	0.16	***
Skin	"	5.63	5.13	0.15	*	5.26	4.94	0.13	N.S.

N.S. = Non significant * = 5.0% ** = 1.0% *** = 0.1%

COMPOSITION OF SIDES FROM BACON AND MANUFACTURING WEIGHT PIGS

	Experiment I				Experiment II			
	Bacon Pigs	Manufacturing Pigs	Standard Error	F Test	Bacon Pigs	Manufacturing Pigs	Standard Error	F Test
Percentage of Sids								
Skin	3.57	3.13	0.09	**	4.77	3.90	0.12	***
Bone	8.73	7.66	0.19	**	7.38	6.55	0.14	***
Fat	33.10	42.20	0.82	***	32.75	40.03	0.91	***
'Lean'	54.61	47.00	0.71	***	55.10	49.52	0.82	***
Subcutaneous Fat	22.83	29.96	0.93	***	7.91	13.35	0.76	***
'Inter + Intra-Muscular Fat'	10.26	12.25	0.34	***	24.84	26.68	0.48	*
Percent Total Skin								
Leg Skin	28.91	27.28	0.62	N.S.	27.90	27.63	0.35	N.S.
Shoulder Skin	24.06	24.44	0.50	N.S.	25.73	25.46	0.65	N.S.
Back Skin	25.39	27.94	0.62	*	24.02	25.52	0.60	N.S.
Belly Skin	21.63	20.34	0.51	N.S.	22.35	21.38	0.72	N.S.
Percent Total Bone								
Leg Bone	32.67	31.47	0.38	*	34.02	33.28	0.36	N.S.
Shoulder Bone	38.98	39.38	0.60	N.S.	44.77	45.27	0.58	N.S.
Back Bone	24.00	24.70	0.49	N.S.	16.80	17.09	0.52	N.S.
Belly Bone	4.35	4.45	0.15	N.S.	4.41	4.36	0.09	N.S.
Percent Total Fat								
Leg Fat	23.19	22.75	0.39	N.S.	22.38	22.26	0.34	N.S.
Shoulder Fat	27.15	25.91	0.76	N.S.	28.63	28.01	0.51	N.S.
Back Fat	32.30	34.40	0.64	*	29.99	31.97	0.35	**
Belly Fat	17.37	16.94	0.30	N.S.	19.00	17.77	0.33	*
Percent Total 'Lean'								
Leg 'Lean'	35.00	34.47	0.52	N.S.	32.89	32.86	0.35	N.S.
Shoulder 'Lean'	32.21	29.91	0.64	*	34.40	33.74	0.40	N.S.
Back 'Lean'	20.69	22.99	0.47	**	20.40	20.74	0.38	N.S.
Belly 'Lean'	12.10	12.63	0.28	N.S.	12.30	12.66	0.19	N.S.

N.S. = Non-significant * = 5% ** = 1.0% *** = 0.1%

THE CHEMICAL COMPOSITION OF PIG CARCASES AT PORK, BACON, AND MANUFACTURING WEIGHTS

APPENDIX

The right side of each carcase was dissected into the following cuts, shoulder, back, belly and leg, as illustrated in Figure 1. The cheek was removed from each side by a cut made immediately anterior to the atlas bone and at right angles to the line of the neck vertebrae. The fore foot was removed by cutting at the distal end of the radius ulna. The hind foot was removed by cutting the distal end of the tibia. The tuber calcis was left on the hind foot. The tail was removed by cutting between the third and fourth coccygeal vertebrae. The kidney and kidney fat were then removed. The half carcass so trimmed was defined as the trimmed side. The shoulder was separated by cutting anterior to the fifth rib, working as close to the rib as possible and extending the cut at both ends. The belly was separated from the back by cutting along the straight line, which runs from the mid-point of the first rib along a line which just touches the ventral surface of the obliquus abdominis internus. Figure 2 illustrates the dissection of the hind leg. A cut was made through the subcutaneous fatty tissue to the muscles underneath, from the anterior edge of the pubis to the ventral region of the side, at right angles to the length of the side. The

abdominal muscles (obliquus abdominis internus and rectus abdominis) and fasciae were then freed from the pubis by cutting the pre pubic tendon and the medial femoral fasciae. The fatty tissue anterior to the incision on the tensor fasciae latae was freed from the anterior edge of the muscle. A cut was then made through the subcutaneous fatty tissue of the lateral side of the leg using the anterior edge of the tensor fasciae latae as the cutting line. The leg was then removed from the side by cutting between the last and second last lumbar vertebrae and extending this cut to the anterior edge of the tuber coxae. During dissection moisture loss was minimised by covering exposed parts of the carcases with damp cloths.

Sampling of meat minus subantaneous fatty tissue.

Each cut was minced through a 10 mm. plate, then thoroughly mixed by hand and minced through a 5 mm. plate. All the mince was again hand mixed and minced through the 5 mm. plate. As the mince emerged a constant fraction, weighing about 600 g., was taken and stored in a screw top waxed carton at - 23°C. When it was convenient to perform the proximate analysis the carton was split down the side. The frozen meat cylinder was crushed in a bone crusher (the meat being forced against a rotating serrated cylinder) and in this way a fine state of division was obtained. Any ice which had been on the inside of the carton was added to the meat which was then mixed in a food mixer and finally minced through a 2 mm. plate and analysed.

Sampling of fatty tissue

Using a chilled mincer head and worm, the chilled fatty tissue cuts were minced through a 10 mm. plate, hand mixed and minced again

through the 10 mm. plate. A constant fraction (about 600 g.) was taken as the tissue emerged. This was frozen in a screw top carton. Immediately before analysis the fatty tissue was minced through a 2 mm. plate.

Analysis of muscular tissue (lean).

Moisture: 15 g. samples were heated in flat bottomed dishes in a mechanical convection air oven at 100°C for 16 hours.

Fat: 15 g. samples were placed in flat bottomed dishes and the moisture removed by desiccating over silica gel or aluminium oxide in an evacuated desiccator (pressure about 6 mm. of mercury) overnight in a chill room (1-2°C). The dried samples were then extracted by petroleum ether 40-60°C in soxhlet extractors for 16 hours.

Protein: The Kjeldahl Gunning procedure was carried out using 5 g. samples weighed on weighed bleached glassine paper. The ammonia was trapped in 2 percent boric acid and titrated with seminormal sulphuric acid. Nitrogen was converted into protein by using the factor 6.25.

Ash: 5 g. samples were incinerated in a fume cupboard and then heated for 16 hours in a muffle furnace at 550°C.

Analysis for fatty tissue.

Moisture: 5 g. samples were heated for 5 hours at 100°C.

Fat: 5 g. samples were treated as in the case of muscular tissue.

Protein: 3 g. samples were subjected to the Kjeldahl Gunning procedure. The trapped ammonia was titrated with decinormal sulphuric acid.

Ash: 3 g. samples were treated as in the case of muscular tissue.

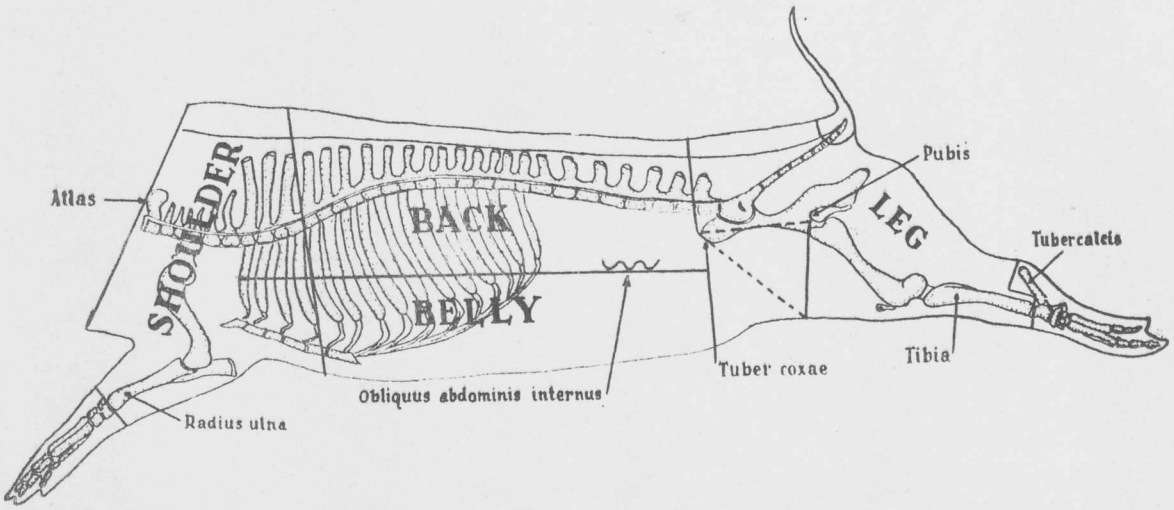

Fig. 1.—Illustrations showing the dissection of the four cuts. (Note: all coccygeal vertebrae not shown.)

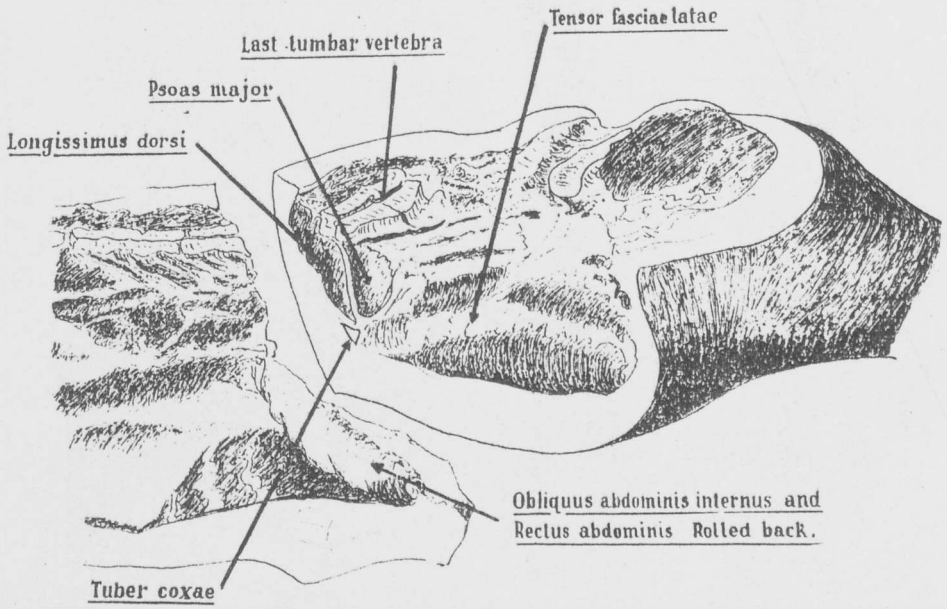

Fig. 2.—Illustration showing the dissection of the hind leg.