Association Among some carcass traits in Three Weight Groups of Pigs

By

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SUMMARY

A TOTAL of seven hundred and eight Large White x Landrace pigs were slaughtered at three weight groups, 34.0, 55.0 and 92.0 kg to collect carcass data. Of these 228, made of 118 castrates and 110 gilts, were slaughtered at 34 kg; 240 pigs, made up of 125 castrates and 115 gilts were slaughtered at 55 kg, while a total of 240 pigs made up of 120 gilts and 120 barrows were slaughtered at 92 kg. Simple correlations as well as regression equations describing relationship among traits were calculated.

Percent of lean cuts and separable lean in carcass decreased while fat cuts and separable fat increased with increasing slaughter weight. Such linear measurements as backfat thickness, loin-eye muscle area and carcass length increased significantly with increasing slaughter weights. Significant differences were obtained for several carcass traits between castrates and gilts slaughtered at 92 kg.

Among the carcass cuts, percentage four lean cuts and loin showed highly significant and positive correlations with separable lean, while the relationship for other cuts such as the ham and shoulder, though significant, were low. Such carcass fat predictors as percentages separable fat, fat cuts and trimmed fat as well as backfat thickness were highly significantly negatively correlated with separable lean, the relationship being highest for percentage separable fat. Dressing percentage and carcass length were poorly correlated with fatness or leanness, while loin eye areas was highly significantly correlated with leanness. The predictive values of the different traits remained relatively the same at the different slaughter weights, although the relationships were better at the 55 kg slaughter weight than at lower weights. The results indicate that while direct chemical determinations or complete physical separation are considered the best measures of carcass quality, the magnitude of the correlation coefficients between separable lean or fat and the different cuts suggests that these could be used with some degree of precision in appraising carcasses.

INTRODUCTION

COMPLETE physical separation of the carcass into lean, fat and bone is perhaps the most accurate measure of fat and lean tissue distribution in pigs. This is however expensive and rarely used except in detailed experimental studies. From the commercial standpoint the ultimate criterion of carcass merit is economic value and this is largely determined by the proportion of commercial cut-out yield that is available for sale. Evaluation of such yields from carcass measurements in market weight pigs is not new (Freden, Berg, Bowland and Doornenbal, 1964 and Buch, Harrington and Johnson, 1962). Appraisal of carcass leanness from chemical analysis has also been reported (Doornenbal and Martin, 1966; Babatunde *et al.*, 1966). While several other chemical and physical parameters such as blood characteristics (Doornenbal and Frankman, 1970), muscle fibre diameter (Berry, Hillers and Kroening, (1968), depth of chine bones (Orme *et al.* 1959) and other techniques (Doornenbal, Wellington and Stouffer, 1962, Hetzer and Millers 1972) have been recognised as predictors of carcass merit. These estimates have however been mainly applied to market weight pigs. Only limited information is available as to the effects of much lower slaughter weights on carcass characteristics and relationships.

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Moreover, up to the present time even though there are no carcass standards for pigs and cattle in Nigeria there has been no reason to believe that relationships established for pigs in the temperate environment would be any different from those reared and slaughtered in the tropics. One recent evidence, (Sofoluke and Dettmers, 1973) suggests that carcasses of pigs presently produced in this country are overfat and indicated a need to establish relationships among some carcass measurements for such animals. This particular study however involved too few animals of widely varying weights to make the conclusions valid. Furthermore, the animals used had been subjected to uncontrolled and unstandardised feeding regimes which could not be said to represent standard husbandry and feeding practices in most units. The present study was, therefore, conducted to investigate the relationship among carcass traits at varying weights usually encountered in experimentation and to reassess the claim by Sofoluke and Dettmers (1973), that pigs reared under the conditions prevalent at Ibadan are overfat using a larger number of animals under standard feeding regimes.

MATERIALS AND METHODS

A total of seven hundred and eight Large White x Landrace pigs were slaughtered at 34, 55 and 92 kg to collect carcass data. Two hundred and twenty eight pigs made up of 118 castrates and 110 gilts were slaughtered at 34 kg, 240 pigs made up of 125 castrates and 115 gilts were slaughtered at 55 kg, while a total of 240 pigs made up of 120 barrows and 120 gilts were slaughtered at 92 kg.

All pigs were reared from weaning on 24% crude protein weaner's ration of the following percentage composition: Yellow

maize, 64.0%; groundnut cake, 20.0%; fishmeal, 3.0%; blood meal, 3.0%; rice bran, 2.0%; skim-milk powder, 2.0%; palm oil, 2.5%; dicalcium phosphate 3.0%; salt, 0.5% and Vitamin-trace mineral mixture at the rate of 5 kg/ton of feed calculated to supply the following per kg of ration: Vitamin A, 8,000 IU; Vitamin D₃, 550 IU; Zinc, 200 mg; Oxytetracycline hydrochloride, 4 mg; and all other members of the B-complex vitamins at levels slightly higher than the minimum recommended levels. All pigs slaughtered at 34 and 55 kg liveweights received the above diets throughout. The pigs slaughtered at 92 kg received the above diets until they attained 45 kg liveweight, when they were switched over to a growing-fattening diet containing 18% crude protein. The reduction in protein level in the diet was effected by a total removal of fishmeal and a reduction in the level of groundnut meal. Water and feed were provided *ad libitum*.

Pigs were slaughtered as they attained the predetermined slaughter weights, after deprivation of feed, but not water for 18 hours. Immediately after slaughter and dressing, the dressed carcasses were split into two longitudinal halves. The right side was immediately dissected into lean, fat and bone, while the left half was chilled for 24 hours at about -5°C, after which the following conventional carcass measurements were taken: length from the anterior end of the first rib to the anterior end of the aitch bone of the pelvis; average backfat thickness opposite the first and last ribs, and the last lumbar vertebra; the loin-eye area calculated from the planimeter tracing of the *longissimus dorsi* muscle sectioned at the tenth rib; the percentage yields of the trimmed ham, loin, and the shoulder cuts, the belly, the jowl, and the trimmed fat percentage.

Correlation amongst carcass traits were determined for the pooled data disregarding sex for the 34 and 55 kg. slaughter weights, while for the 92 kg. weight, correlations were determined separately for males and females as well as for the pooled data disregarding sex. Estimates of regression coefficient and intercept and slope of regression equations were made according to standard procedures (Steel and Torrie, 1960).

RESULTS AND DISCUSSION

Some selected carcass traits for Large White x Landrace pigs slaughtered at 3 different weight groups are summarised in table 1. Percent lean, ham, shoulder, four lean cuts decreased as slaughter weights increased, while the percent fat and fat cuts increased progressively with increasing slaughter weight. At heavier weights carcass length, mean backfat thickness, percent trimmed fat loin-eye muscle area were higher than at lower weights. The magnitude of the differences was greater and highly significantly ($P < 0.01$) greater for the 92 kg.-slaughter group compared to the 34 kg slaughter group. A comparison of the 34 and 55 kg slaughter groups showed significantly ($P < 0.05$) higher backfat thickness, percent trimmed fat, loin-eye muscle area and carcass length for the latter group. These results agree well with the earlier findings of Babatunde *et al.* (1966), and Emerson *et al.* (1964) who found that, as slaughter weight was lowered from 93 to 45 kg., there was a decrease in carcass length, dressing percent and loin-eye muscle area and an increase in the percent of primal and lean cuts. Various other studies have illustrated that pigs of less than normal slaughter weight produce leaner carcasses (Field *et al.*, 1961, Varney *et al.* 1962). Compared to the data of Sofoluke and

Dettmers (1973), the proportion of the different tissues obtained by gross carcass dissection were remarkably different. The lean percentages in dressed carcass obtained in the present study were 61.87, 61.83 and 58.39% for the 34, 55 and 92 kg. slaughter weights respectively compared to the value of 40.62% estimated by these authors to be present in pig carcasses slaughtered at liveweights ranging between 64 and 103 kg. Carcass yield reported by these authors was low in comparison to the mean values reported in our study (Table 1). Mean percentage fat plus skin at 34, 55 and 92 kg. slaughter weights reported in this study were 23.35, 24.81 and 30.10% respectively compared to a mean value of 44.14% reported by Sofoluke and Dettmers (1973). The gross composition presented in their study is quite suprising, since their very low dressing % of 70.09 and backfat thickness of 2.82 cm. should be indicative of a lean carcass. Contrary to the views expressed by these authors the carcasses obtained from pigs properly fed and well managed were comparable to those of a similar breed managed and slaughtered elsewhere in the temperate Countries. For the 92 kg. slaughter group which approximates to the market weight of pigs in the United States, the loin-eye muscle area, carcass length and mean backfat thickness of 23.57 cm², 78.63 cm and 3.17 cm respectively fall within the range of 22.6 cm², 76-81 cm and 2.8-3.6 cm for the corresponding measurements required of a medium pig. Based on records from some Danish test stations and data from British experiments, Harrington (1958) gives the dressing percentage of Large White and Landrace pigs slaughtered between 41 and 79 kg. as 75-80% and 73.5% respectively. The dressing percentages presented in our study for Large White x Landrace crosses are in agreement with these values.

There is no physiological bases for the expectation that pigs reared in the hot humid tropics would be fatter, quite apart from the inadequate nutrition which we presume could have been a major problem with the pigs used in the report by Sofoluke and Dettmers (1973). The data presented by us tend to indicate the production of leaner pig carcasses under the conditions that prevail at Ibadan relative to reports from the temperate countries, under proper nutritional and management regimes. This proposition is particularly strengthened by the fact that fat deposition is more likely to be favoured in colder climates where fat deposition as an additional insulation against cold is quite likely. Heat dissipation is a problem for pigs in the tropics and under situations of balanced feeding, excessive fat deposition is not likely to be favoured. The nature and extent of fatty tissue deposits is vitally related to ability to be buffered against cold stress. Some studies exist on the effects of environmental temperatures on carcass quality in pigs. Sorensen (1962), had suggested from his studies, that pigs in a cold environment may produce fatter carcasses than pigs in a warm environment, when rates of gain are similar for both. Contrary to this suggestion Seymour Speer, Hays, Mangold and Hazen (1964), Jensen *et. al.* (1963) Grosse and Pfeiffer (1963) and Holmes and Coey (1967) found that environmental temperatures *per se* have little effects on carcass composition.

A summary of selected carcass traits for castrated male and female Large White x Landrace pigs slaughtered at 92 kg. liveweight appear in table 2. The females had significantly ($P < 0.05$) lower percent fat cuts, dressing percent, backfat thickness and higher percent lean and loin-eye muscle area than castrates while percentages lean cuts, ham and loin were

highly significantly ($P < 0.001$) higher for females than for castrates. Percentages fat plus skin and trimmed fat were highly significantly higher for castrates than for females. These observations with respect to sex influences on carcass quality are in complete agreement with the report by Lodge (1969), that female pigs were leaner than castrated males. The sex differences in carcass leanness observed are also in general accord with the scientific evidence as reviewed by Field (1971).

Relationships between some linear measurements, gross composition and carcass cuts for pigs slaughtered at 34 kg liveweight are presented in table 3. The lean cuts as percentage of chilled carcass weight, loin and loin-eye muscle area showed highly positive relationships with actually dissected lean while for others such as the ham and shoulder, though the relationships were significant, were as low as not to be regarded as good predictors. Percent four lean cuts was negatively correlated with the fat parameters which is in agreement with the observations of Zobrisky *et. al.* (1954) and since confirmed by others (Gnaedinger *et. al.* 1963; Doornenbal, 1961) that the percent lean cuts is inversely associated with backfat and percent belly and directly associated with the lean traits. Such fat prediction traits as percentages fat, fat cuts, trimmed fat and backfat thickness were highly significantly negatively correlated with carcass leanness. Actually dissected fat showed the highest correlation, followed by percent trimmed fat and then backfat thickness. The superior correlation of trimmed fat to percentage separable lean and lean cuts compared to mean backfat thickness may be related to the built-in-part-whole relationship between these variables. Smith and Carpenter (1973), had observed that fat thickness measured at three locations opposite the

TABLE 2
Sex differences in some selected carcass traits of Large White X Landrace pigs slaughtered at 92 kg

Items	Barrows				Gilts				t-values	Probability	Conclusion
	Range	Mean±SD	CV	Range	Mean±SD	CV	Range	Mean±SD			
Dressing %	69.4-80.1	76.38±2.11	2.76	73.8-79.6	74.72±4.65	6.22	3.00	.01	> P	> .002	Significant
Lean (%)	52.3-65.3	57.41±4.19	7.30	54.3-65.1	59.01±4.71	7.98	2.35	.02	> P	> 0.01	Significant
Four Lean Cuts (%)	54.6-73.5	60.43±2.78	4.60	55.5-68.4	62.08±2.71	4.37	4.29	P	< 0.001		Very highly significant
Ham (%)	22.0-29.8	24.94±1.31	5.25	23.5-28.4	25.89±1.24	4.79	4.97	P	< 0.001		" "
Loin (%)	12.0-15.6	13.77±1.01	7.34	12.5-16.8	14.39±1.01	7.03	3.99	P	< 0.001		" "
Shoulder (%)	18.8-26.0	20.91±1.29	6.17	18.9-24.8	22.03±2.83	12.85	1.30	.025	> P	> .10	Not significant
Carcass Length (CM)	74.0-83.0	78.38±2.00	2.55	74.0-85.2	78.89±2.09	2.65	1.57	.025	> P	> .10	Not significant
Loin-Eye area CM ²	15.6-29.1	22.91±3.18	13.88	18.5-31.0	24.23±2.63	10.85	2.95	.01	> P	> 0.002	Significant
Fat + Skin (%)	18.8-35.7	30.99±2.93	9.46	24.4-35.3	29.17±2.70	9.26	4.21	P	< .001		Very highly significant
Fat Cuts (%)	20.4-27.4	23.97±1.56	6.51	20.2-26.8	23.50±1.41	6.00	2.07	.05	> P	> 0.02	Significant
Back Fat Thickness (CM)	2.5-4.1	3.25±0.36	11.08	2.4-4.0	3.08±0.36	11.69	3.01	.01	> P	> 0.002	Significant
Trimmed Fat (%)	11.6-24.6	16.72±2.39	14.29	10.8-18.9	14.99±1.92	12.81	5.18	P	< .001		Very highly significant

TABLE 3

Matrix of correlation coefficients between selected carcass traits of Large White X Landrace pigs slaughtered at 34 kg

	Lean %	Four Lean Cuts %	Ham %	Loin %	Shoulder %	Carcass Length	Dressing %	Loin-Eye Area	Fat %	Fat Cuts %	Backfat Thickness	Trimmed Fat %
Lean %	1.00											
Four Lean Cuts %	0.61*	1.00										
Ham %	0.21*	0.22*	1.00									
Loin %	0.64*	0.56*	0.11	1.00								
Shoulder %	0.34*	0.54*	0.16	0.27*	1.00							
Carcass Length	0.03	0.10	0.10	0.14	-0.07	1.00						
Dressing %	0.22*	0.11	0.09	0.24*	-0.03	-0.26	1.00					
Loin-Eye Area	0.76*	0.51*	0.33*	0.47*	-0.24*	0.05	-0.31**	1.00				
Fat %	-0.75*	-0.54*	-0.28*	-0.50*	-0.29*	-0.08	0.30**	-0.57—	1.00			
Fat Cuts %	-0.47*	-0.21*	-0.09	-0.40—	-0.13	-0.12	0.25*	-0.38**	0.31**	1.00		
Backfat Thickness	-0.62*	-0.49*	-0.31*	-0.47*	-0.36**	-0.30**	0.08	-0.46—	0.41**	0.30**	1.00	
Trimmed Fat %	-0.66*	-0.64*	-0.38*	-0.57*	-0.29*	-0.24*	0.17	-0.64**	0.56**	0.23*	0.60**	1.00

* $P < 0.05$ ** $P < 0.001$

longissimus dorsi muscle was the single measurement which was most closely related to percentages of separable lean and four lean cuts. This is contrary to the observations in this study. More in line with our finding however, are the results of Doornenbal (1967), which had clearly indicated low but significant correlations between external fat measurements and total fat in the carcass and cuts. Duniec *et al.* (1961), had earlier presented data suggesting that the deposition of internal fat and the development of subcutaneous fat in pigs are governed by different physiological and genetic factors, thus suggesting that linear measurements of subcutaneous fat thickness may not accurately predict overall carcass fatness. Correlation coefficients are also presented in tables 4 and 5 for relationship among several selected carcass traits for pigs slaughtered at 55 and 92 kg. liveweight. In general, the predictive values of the different traits remained relatively the same, although the relationship among the various measures of leanness were better at the 55 kg. slaughter weight than at lower weights. The relationship between separable lean and the individual lean cuts and four lean cuts were better at the 55 kg. than the 92 kg. weight. The reasons for these lower relationships obtained at the higher weight is not clear but could be related to the fact that the cutting and trimming procedures are fairly unstandardised and that the errors in the cutting of larger carcasses may be such as to induce the lower relationships observed. The relationship between carcass length and other measures of carcass value has remained fairly controversial. While Engleman *et al.* (1950) and Cummings and Winters (1951) had reported highly positive correlations between carcass length and carcass leanness, more recent studies (Lidvall

et al. 1972; and Smith and Carpenter, 1973) have indicated low relationships. In the present study, the relationship between carcass length and other parameters of leanness was very low at the 34 kg. slaughter weight, higher and significant at the 55 kg. slaughter weight, although still low compared to several other traits. At the 92 kg. stage the relationships were higher still and were highly significantly positively related to separable lean and lean cuts. The relationship between the dressing percentage and other variables were low for the 34 and 55 kg. slaughter weights, while they were higher at the 92 kg. slaughter weight, being negatively correlated with the lean measurements and positively correlated with the predictors of carcass fatness. It would appear from the magnitude of correlation coefficients that this variable was more closely related to the lean content of the body. This is similar to the observation of Babatunde *et al.* (1966) and therefore more in line with their suggestion that this trait should be influenced more by lean than by fat parameters. The data of Sofoluke and Dettmers (1973), contrary to our observations, show greater relationship between dressing percentage and carcass fat than lean percent. Relationship between area of *longissimus dorsi* muscle and other carcass predictors were highly significant and positive. These were 0.76 and 0.51, 0.74 and 0.74 and 0.47 and 0.67 for the 34, 55 and 92 kg. slaughter weights, for the correlations between this variable and percentage separable lean and four lean cuts respectively. The fairly high correlations obtained in this study is contrary to the observations of Berry *et al.* (1968a) that loin-eye area appeared to have the lowest relationships with other sizes, weight and length variables. They had obtained correlation coefficients of

TABLE 4

Matrix of correlation coefficients between selected carcass traits of Large White X Landrace pigs slaughtered at 55 kg

	Lean %	Four Lean Cuts %	Ham %	Loin %	Shoulder %	Carcass Length	Dressing %	Loin-Eye Area	Fat %	Fat Cuts %	Backfat Thickness	Trimmed Fat %
Lean %	1.00											
Four Lean Cuts %	0.84**	1.00										
Ham %	0.76**	0.73**	1.00									
Loin %	0.60**	0.57**	0.47**	1.00								
Shoulder %	0.50**	0.56**	0.33**	0.30**	1.00							
Carcass Length	0.19*	0.32**	-0.06	-0.09	.01	1.00						
Dressing %	-0.01	0.12	-0.10	-0.38**	-.13	0.15	1.00					
Loin-Eye Area	0.74**	-0.74**	0.69**	0.53**	.59**	0.23**	-0.10	1.00				
Fat %	-0.74**	-0.68**	-0.72**	-0.62**	-0.48**	-0.32**	.09	-0.61**	1.00			
Fat Cuts %	-0.67**	-0.69**	-0.61**	-0.69**	-0.37**	-0.36**	.04	-0.58**	0.62**	1.00		
Backfat Thickness	-0.48**	-0.60**	-0.54**	-0.34**	-0.66**	-0.30**	.07	-0.58**	0.42**	0.36**	1.00	
Trimmed Fat %	-0.73**	-0.75**	-0.74**	-0.47**	-0.73**	-0.24**	-.11	-0.77**	0.54**	0.45**	0.65**	1.00

* $P < 0.05$ ** $P < 0.001$

TABLE 5
Matrix of correlation coefficients between selected carcass traits of Combined Large White X Landrace barrows and gilts slaughtered at 92 kg

	Lean %	Four Lean Cuts	Ham %	Loin %	Shoulder %	Carcass Length	Dressing %	Loin-Eye Area	Fat %	Fat Cuts %	Backfat Thickness	Trimmed Fat %
Lean %	1.00											
Four Lean Cuts %	0.53**	1.00										
Ham %	0.47**	0.73**	1.00									
Loin %	0.50**	0.68**	0.54**	1.00								
Shoulder %	0.10	0.17*	0.22*	0.07	1.00							
Carcass Length	0.39**	0.52**	0.36**	0.42**	0.20*	1.00						
Dressing %	-0.32**	-0.38**	-0.36**	-0.44**	-0.07	-0.35**	1.00					
Loin-Eye Area	0.47**	0.69**	0.55**	0.62**	0.12	0.44**	-0.35**	1.00				
Fat %	-0.60**	-0.79**	-0.67**	-0.59**	-0.23*	-0.52**	0.26**	-0.62**	1.00			
Fat Cuts %	-0.35**	-0.61**	-0.41**	-0.53**	-0.09	-0.54**	0.12	-0.48**	0.59**	1.00		
Backfat Thickness	-0.32**	-0.55**	-0.50**	-0.42**	-0.15	-0.39**	0.21*	-0.41**	0.63**	0.56**	1.00	
Trimmed Fat	-0.46**	-0.68**	-0.61**	-0.53**	-0.20	-0.45**	0.27**	-0.56**	0.80**	0.59**	0.66**	1.00

* $P < 0.05$ ** $P < 0.001$

0.24, 0.29 and 0.52 for the relationship between loin-eye muscle area taken at opposite the tenth rib and lean cuts, ham and loin respectively. Babatunde *et. al.* (1966) and Sofoluke and Dettmers (1973) had also reported low relationships between this variable and carcass leanness, while Kline and Hazel (1955) and Orme *et. al.* (1967) had reported correlations between loin-eye area and lean cuts higher than those reported by the above authors and more in line with our observation. Berry *et. al.* (1968b) and Topel *et. al.* (1965), have however reported higher correlation coefficients between lean cuts and loin-eye muscle area taken at the 14th and 1st lumbar vertebrae. The evidence presented by these authors raises important questions regarding the present practice of measuring loin-eye area at the 10th rib.

Relationship among selected carcass traits for gilts slaughtered at 92 kg. are presented in table 6, while those for barrows slaughtered at a similar weight appear in table 7. The observed correlations for lean cuts, loin, shoulder, length, dressing percentages and loin-eye area and separable lean in carcass was higher in the barrows than the gilts, while the relationship between such predictors of carcass fatness as fat cuts, percent separable fat, trimmed fat and backfat thickness and separable lean and fat were higher in the gilts than barrows. Doornenbal and Martin (1966) in their study showed that the order of importance of several predictive variables was somewhat different for each sex. In another study (Doornenbal and Frankham 1969) comparing blood characteristics and backfat thickness as predictors of carcass composition of market weight pigs, distinct sex differences were obtained in the magnitude of the correlation coefficient,

being much higher and generally significant in gilts and low and non-significant in barrows. These reports, while not directly applicable to such measurements as have been applied in the present study, show that differences between sexes exist. Lidvall *et. al.* (1972), had also observed sex and breed differences in the use of carcass length in predicting carcass composition. While the reason for these differences may not be quite clear, the observed differences clearly point to the need for the development of separate prediction equations for each sex in predicting carcass composition from several easier techniques for better precision.

Table 8 summarises the regression equations describing the relationships of weights of some commercial cuts and fat trim with carcass lean in pigs slaughtered at three weights as well as separate predictive equations for gilts and barrows slaughtered at 92 kg. liveweight, while in table 9 are presented regression equation describing the relationships between some linear measurements and separable lean. Similar regression parameters for the relationship between some conventional predictors of carcass fatness and carcass separable fat appear in table 10. These for each variable different estimates of regression coefficients were obtained for both sexes, thus confirming the need for separate prediction equations for gilts and barrows to achieve greater precision.

CONCLUSIONS

The results presented in this study indicate no adverse influences of environment *per se* on the type of pig carcass produced, but rather suggest that poor carcasses would result essentially from imbalanced or inadequate nutrition, thus contradicting the evidence presented by

TABLE 6
Matrix of correlation coefficients between selected carcass traits of Large White X Landrace gilts slaughtered at 92 kg

	Lean %	Four Lean Cuts %	Ham %	Loin %	Shoulder %	Carcass Length	Dressing %	Loin-Eye Area	Fat %	Fat Cuts %	Backfat Thickness	Trimmed Fat %
Lean %	1.00											
Four Lean Cuts %	0.40**	1.00										
Ham %	0.40**	0.75**	1.00									
Loin %	0.40**	0.68**	0.56**	1.00								
Shoulder %	0.06	0.15	0.22*	0.02	1.00							
Carcass Length	0.27*	0.42**	0.30*	0.40**	0.24*	1.00						
Dressing %	-0.17	-0.22*	-0.21	-0.27	-0.02	-0.24*	1.00					
Loin-Eye Area	0.33*	0.69**	0.47**	0.44**	0.10	0.29*	-0.25*	1.00				
Fat %	-0.53**	-0.86**	-0.69**	-0.59**	-0.23	-0.44**	0.17	-0.73**	1.00			
Fat Cuts %	-0.26*	-0.72**	-0.54**	-0.54**	-0.07	-0.57**	0.14	-0.61**	0.65**	1.00		
Backfat Thickness	-0.28*	-0.76**	-0.63**	-0.50**	-0.16	-0.44**	0.13	-0.58**	0.68**	0.65**	1.00	
Trimmed Fat %	-0.36**	-0.79**	-0.66**	-0.55**	-0.21	-0.40**	0.24*	-0.65**	0.79**	0.66**	0.74**	1.00

* P < 0.05
** P < 0.001

TABLE 7

Matrix of correlation coefficients between selected carcass traits of Large White X Landrace barrows slaughtered at 92 kg

	Lean %	Four Lean Cuts %	Ham %	Loin %	Shoulder %	Carcass Length	Dressing %	Loin-Eye Area	Fat %	Fat Cuts %	Backfat Thickness	Trimmed Fat %
Lean %	1.00											
Four Lean Cuts %	0.43**	1.00										
Ham %	0.38**	0.73**	1.00									
Loin %	0.48**	0.70**	0.42**	1.00								
Shoulder %	0.19	0.55**	0.37**	0.25*	1.00							
Carcass Length	0.38**	0.60**	0.44**	0.59**	0.24*	1.00						
Dressing %	-0.47**	-0.64**	-0.50**	-0.58**	-0.41**	-0.56**	1.00					
Loin-Eye Area	0.48**	0.70**	0.56**	0.72**	0.27**	0.58**	-0.49**	1.00				
Fat %	-0.46**	-0.64**	-0.50**	-0.49**	-0.45**	-0.51**	0.39**	-0.47**	1.00			
Fat Cuts %	-0.21	-0.43**	-0.23*	-0.47**	-0.27*	-0.39**	.08	-0.34*	0.55**	1.00		
Backfat Thickness	-0.11	-0.30*	-0.23*	-0.23*	-0.10	-0.27*	0.30*	-0.19	0.54**	0.47**	1.00	
Trimmed Fat %	-0.31*	-0.49**	-0.45**	-0.40**	-0.36**	-0.40**	0.31*	-0.44**	0.75**	0.53**	0.56**	1.00

* $P < 0.05$ ** $P < 0.004$

TABLE 8

Relationship between some carcass cuts [x] and percentage separable lean [Y] in carcass of pigs slaughtered at three weights (Regression parameters).

Carcass cuts	Prediction equations	S_b	$S_{y.x}$
<u>Four Lean Cuts</u>			
34 kg.	$Y = 29.4954 + 0.4592x$	0.0536	2.6545
55 kg.	$Y = 11.8351 + 0.7238x$	0.0344	1.3185
92 kg. (Pooled)	$Y = 10.7454 + 0.7779x$	0.0952	3.2733
M	$Y = 18.2457 + 0.6481x$	0.1467	3.7829
F	$Y = 5.1120 + 0.8682x$	0.2158	4.3168
<u>Percent Loin</u>			
34 kg.	$Y = 36.5498 + 1.5099x$	0.1628	2.5741
55 kg.	$Y = 34.4682 + 1.6200x$	0.1588	1.9440
92 kg. (Pooled)	$Y = 32.5096 + 1.8381x$	0.2435	3.3429
M	$Y = 29.9900 + 1.9913x$	0.3924	3.6758
F	$Y = 27.8421 + 2.0985x$	0.4216	3.9241
<u>Percent Fat Cuts</u>			
34 kg.	$Y = 77.1588 - 0.7357x$	0.1241	2.9569
55 kg.	$Y = 85.3107 - 0.9464x$	0.0632	1.6344
92 kg. (Pooled)	$Y = 79.7718 - 0.9007x$	0.1843	3.6159
M	$Y = 70.9299 - 0.5640x$	0.2832	4.0966
F	$Y = 79.4199 - 0.8685x$	0.3499	4.5480
<u>Percent Trimmed Fat</u>			
34 kg.	$Y = 66.6713 - 3.2663x$	0.6925	3.0847
55 kg.	$Y = 70.4991 - 3.1524x$	0.4236	2.1318
92 kg. (Pooled)	$Y = 70.4170 - 0.7588x$	0.1120	3.4274
M	$Y = 66.4968 - 0.5435x$	0.1797	3.9836
F	$Y = 72.2480 - 0.8831x$	0.2482	4.3942

S_b = Standard error of slope b ; $S_{y.x}$ = sample standard deviation from regression.

TABLE 9

Relationship between some linear carcass measurements [x] and percentage lean [Y] in carcass of pigs slaughtered at three weights (Regression parameters)

Carcass measurements	Prediction equations	S_b	$S_{y.x}$
<u>Carcass Length</u>			
34 kg.	$Y = 58.5378 + 0.0558x$	0.1671	3.3485
55 kg.	$Y = 39.5237 + 0.3446x$	0.1309	2.3857
92 kg. (Pooled)	$Y = 0.3657 + 0.7379x$	0.1332	3.5543
M	$Y = -4.9883 + 0.7961x$	0.2090	3.8757
F	$Y = 11.0079 + 0.6085x$	0.2354	4.5351
<u>Loin-Eye Muscle Area</u>			
34 kg.	$Y = 45.3972 + 1.1733x$	0.0901	2.1772
55 kg.	$Y = 60.1612 + 0.5436x$	0.2319	2.3946
92 kg. (Pooled)	$Y = 44.1364 + 0.6047x$	0.0868	3.4071
M	$Y = 42.9205 + 0.6325x$	0.11246	3.6758
F	$Y = 44.6903 + 0.5910x$	0.1834	4.4462
<u>Mean Backfat Thickness</u>			
34 kg.	$Y = 68.9189 - 1.8698x$	0.3069	2.9388
55 kg.	$Y = 85.3979 - 1.1228x$	0.0915	1.8039
92 kg. (Pooled)	$Y = 67.9726 - 3.3384x$	0.7558	3.6570
M	$Y = 61.5708 - 1.2803x$	1.2474	4.1646
F	$Y = 10.2930 - 3.6633x$	1.3623	4.5216

S_b = Standard error of slope, b ; $S_{y.x}$ = sample standard deviation from regression.

TABLE 10

Relationship between some predictors (x) of carcass fatness and percentage fat (Y) in carcass of pigs slaughtered at three weights (Regression parameters)

Carcass fat Predictors	Prediction equations	S_b	$S_{y.x}$
<i>Percent Fat Cuts</i>			
34 kg	$Y = 13.4163 + 0.4780x$	0.1317	3.1374
55 kg	$Y = 7.7575 + 0.8124x$	0.0756	1.4907
92 kg (Pooled)	$Y = 2.6171 + 1.1564x$	0.1210	2.3738
M	$Y = 6.2288 + 1.0330x$	0.1691	2.4470
F	$Y = -0.0800 + 1.2447x$	0.1578	2.0518
<i>Mean Backfat</i>			
34 kg	$Y = 16.1130 + 3.1465x$	0.6286	3.0099
55 kg	$Y = 18.8789 + 2.1568x$	0.3426	1.7243
92 kg (Pooled)	$Y = 14.2011 + 5.0059x$	0.4719	2.2832
M	$Y = 16.7062 + 4.3950x$	0.7387	2.4661
F	$Y = 13.4620 + 5.1000x$	0.5965	1.9797
<i>Percent Trimmed Fat</i>			
34 kg	$Y = 14.8581 + 0.7482$	0.0994	2.7340
55 kg	$Y = 18.2872 + 0.4957$	0.0568	1.5992
92 kg (Pooled)	$Y = 14.1388 + 1.0051$	0.0576	1.7640
M	$Y = 15.6166 + 0.9195$	0.0874	1.9380
F	$Y = 12.5171 + 1.1109$	0.0935	1.6554

S_b = Standard error of slope b; $S_{y.x}$ = sample standard deviation from regression.

Sofoluke and Dettmers (1973), that pigs carcasses produced at Ibadan are overfat and differ greatly from those reported elsewhere. The carcass values as well as the relative importance of the different measures of carcass leanness or fatness and the relationship among these various measures would appear to be in line with observations reported by several workers in many other countries of the world. There was however a noticeable tendency for the separable lean content as well as lean cuts to be higher in our report than many other reports from the temperates. Observations on sexual influences on carcass traits and relationships were similar. These point to the fact, that in attempting to develop standards for judging pig carcasses in the Nigerian situation, the considerable body of information that has accumulated elsewhere would be applicable. What needs to be one would be to relate these to the specified demands of the pork market and consumer

preferences in this country. While such measures as direct chemical determinations or complete physical separation are considered the best measures of carcass quality, the magnitude of the correlation coefficients between separable lean or fat and the various cuts indicates that these could be used with some degree of precision in appraising carcasses resulting from experiments. Their use is particularly justified on the basis of their importance in measuring conformation. What need to be done is to clearly define the cuts, to keep the cutting errors to a minimum since the most important drawback of this technique lies in the fact that by their very nature, there must be considerable variation in such cuts from place to place. A major advantage in their use lies in the fact that they leave the carcass in marketable and acceptable cuts as opposed to near mutilation in chemical analysis and complete physical separation.

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