APPENDIX 2.1

(referred to in paragraph 2.5)

Supply of animal waste in Great Britain

1. The Meat and Livestock Commission (MLC) provided us with its estimates of average carcase weights and by-product yields from slaughtering for human consumption in Great Britain. The following estimates of animal waste outputs from the abattoirs in 1982 combine these data with MAFF figures of total slaughterings:

	Cattle	*Pigs*	*Sheep*
1. Slaughterings ('000)	3,200	14,137	13,685
2. Average yields of animal waste per animal (lb):*			
(*a*) Sales direct to renderer	199·9	32·8	24·1
(*b*) Indirect disposal to rendering†	108·0	14·2	4·0
(*c*) Total	307·9	47·0	28·1
3. Total waste supplied to renderers:			
Million lbs (row 1 × row 2)	985	664	385
Thousand tonnes	447	301	175

Source: MLC.

* Excludes blood, material collected directly from abattoirs for pet food production and by-products processed separately (casings, materials for pharmaceutical uses and fats for edible rendering), but includes a small amount of by-product material destined for pet food via renderers.

† Material resulting from butchery operations at cutting plants, retail depots and retail shops.

2. The supply of animal waste other than edible fats to renderers which originated in slaughtering in Great Britain was therefore about 0·92 million tonnes in 1982. In order to derive the total 'supply of animal material which is acquired for processing in rendering plants' in Great Britain (the definition in this reference) it is necessary to add to this an estimate for edible fats, blood, fat and bone derived from meat imports and waste supplied by knackers, and to deduct material supplied to renderers but destined for pet food (without processing in rendering plants).

3. There are no precise data on the activities of knackers. The Licensed Animal Slaughterers and Salvage Association provided us with its best estimates of throughputs and we deduced from these that knackers slaughter about 30,000 animals per week. If the mix of animals was identical to that for slaughtering for human consumption, and the by-product yields also identical, the arithmetic of paragraph 1 above results in a supply of animal waste from knackers of 45,000 tonnes in 1982. Since in this case some of the carcase meat and red offal also enters the animal waste sector the total material available from this source would be nearer to 0·1 million tonnes on this arithmetic. Other assumptions and estimates can readily be made but we doubt whether volumes significantly in excess of this figure are supplied as animal waste by knackers.

4. We do not have independent data on the supply of fats for edible rendering or the supply of blood but our survey indicated small tonnages only (see Table 2.2—45,000 tonnes for edible fats and 48,000 tonnes for blood). Neither can we estimate how much of the material supplied to renderers is destined for pet food, but we believe this to be a relatively small tonnage. We also believe the supply of fat and bone derived by butchers from imported meat to be small (under 50,000

tonnes), and for our purposes this can be assumed to cancel out the pet food material contained in paragraph 1 above. We therefore estimate from these data that the total supply of animal waste (as defined in our reference) in 1982 was:

	million tonnes
Edible fats	0·04
Blood	0·05
Other abattoir material	0·92
Supplied by knackers	0·10
Total	1·11

5. This total of 1·1 million tonnes, which is derived from data sources which are largely independent of our survey, broadly corroborates the total shown in the survey for the volume of raw animal waste acquired for rendering in Great Britain in 1982 (see paragraph 2.5 in main text).

6. The MLC also provided estimates of specialised by-product yields on the same basis as those for animal waste shown above. These average yields, which include fats for edible rendering, were:

		lb
Cattle	*Pigs*	*Sheep*
71·7	16·8	15·15

When multiplied up by total slaughterings in 1982 these data provide an estimate of 0·32 million tonnes of specialised by-products, of which 0·045 million tonnes is our estimate of fats for edible rendering included in the total in paragraph 4 above.

7. Other animal by-products include hides and skins and edible offal. United Kingdom imports of edible offal in 1982 were 0·12 million tonnes and domestic production is estimated to have been 0·15 million tonnes. Exports were negligible. The supply of edible offal in the United Kingdom in 1982 was 0·26 million tonnes and for Great Britain this figure can be rounded to 0·2 million tonnes.

8. Our estimate of the total supply of animal by-products in Great Britain in 1982, excluding hides and skins, is therefore:

	million tonnes
Animal waste	1·1
Specialised by-products	0·3
Edible offal	0·2
	1·6

9. There is a series of assumptions and approximations in these estimates and in addition the annual total of slaughterings fluctuates from year to year. If the arithmetic set out above is applied to the slaughtering data in Table 2.1 the range for the total supply of by-products in Great Britain over 1973 to 1983 is 1·5 to 2·0 million tonnes per annum.

APPENDIX 4.1

(referred to in paragraphs 4.8, 4.31, 4.40, 4.43, 4.47, 4.48)

The survey of renderers: collection and analysis of data

The survey

1. In June 1983 the Commission issued a questionnaire to 63 businesses believed to be engaged in rendering in Great Britain. The list of businesses was based on information supplied to us by the United Kingdom Renderers' Association, supplemented by information from other sources in the industry, and is thought to include all renderers of significant size in Great Britain.

2. Of the 63 businesses, three had ceased trading and five reported that they did not undertake rendering. Of the remaining 55, 48 returned completed questionnaires, an effective reponse of 87 per cent. In terms of throughput, the response is believed to be somewhat higher as the non-responders are thought to be relatively small.

3. Information was subsequently received on another two companies which had not been included in the postal survey, and a further two companies which had been included returned partial information by means other than the questionnaire. In total therefore at least some of the information sought by the questionnaire was available on 52 out of 57 companies or 90 per cent.

The statistical analysis

4. Not all questionnaires were returned and not all the questions on returned questionnaires were completed. Although data are usually only available for some sample of respondents (the size of which varies between topics) we have no reason to suppose that this introduces any bias into the results of the analysis.

5. The purpose of the analysis was two-fold: to extract summary statistics which describe the structure of the industry and to identify and quantify factors underlying observed variations in costs and the average prices paid by renderers for raw materials. The summary statistics are contained in Chapters 2 and 4 of our report. The second part of the work required a systematic investigation of the data by means of regression analysis. This is reported below.

The regression analysis: cost and price models

6. Regression analysis is designed to establish whether a supposed relationship between a 'dependent' variable (conventionally denoted by Y) and a set of one or more 'explanatory' variables ($X_1, X_2 \ldots X_n$) is supported statistically and to estimate the parameters of that relationship ($\alpha, \beta_1 \ldots \beta_n$). Formally:

$$Y_i = \alpha + \beta_1 X_{i1} + \beta_2 X_{i2} \ldots \beta_n X_{in} + e_i$$

where the subscript i refers to the ith observation of the variable and e is a random error term. We tested a number of equations of this type ('models') for each of the cost and price relationships in which we were interested.

The cost models

Model 1: transport costs

7. The transport cost model has as the dependent variable the transport cost (in £ per tonne) of collecting raw material into the plant, CT. It should be noted that because of data limitations CT is only a partial measure of the transport cost of supplying plants with raw material. Transport costs of collection were not available for material delivered into the plant by collectors and were not always available for material obtained by a plant from depots or other plants.

8. The explanatory variables are as follows:

R1 = percentage of throughput collected from within a 50 mile radius of the plant.

R2 = percentage of throughput collected from outside a 100 mile radius of the plant.

B = average size of consignment calculated as

$$\frac{\text{tonnage of raw material processed}}{\text{number of sources}}$$

where sources include the abattoirs, boning-out plants, butchers' shops, hide markets, collectors and other sources from which a plant reported obtaining raw materials.

C1 = ratio of number of collectors to own transport employees.

V = volume of plant's raw material throughput ('000 tonnes per annum).

9. Our questionnaire data suggest that there is no simple relationship between plant size measured by total tonnage of raw material processed per annum and reported radii of collection of raw materials. This is probably due to various factors. Plants differ in the mix of raw materials rendered and some raw materials are of more limited availability than others (Table 4.2). This means that a specialised plant (for example, a dripping plant) though perhaps small in size compared to the average for the industry may need to go relatively far afield to secure an adequate supply of material. There is also the posibility that distances may be understated because the radius of collection of only part of the material processed by larger plants has been reported on the questionnaire. In some cases material may be transported over longer distances because collection rounds have been maintained despite the closure of the company's local processing plants, or because of a national agreement to collect from all the abattoirs, boning-out plants etc owned by one large meat processing company. To allow for the effect of radius of collection of material on transport costs of collection R1 and R2 are included as explanatory variables in addition to V, the estimated co-efficient on which measures any residual scale diseconomies of transport costs (or any scale economies).

10. It was expected that the average size of consignment (indicated by B) would be an important determinant of the cost per tonne of collecting raw material (paragraph 4.29). C1 appears in the model as an 'explanatory' variable

because of anticipated and probably non-trivial measurement errors in the dependent variable.[1]

Model 2: processing costs

11. The dependent variable is CP, the plant's cost of processing material in £ per tonne of input. The explanatory variables are:

PERO = percentage of input of material which is soft offal.

PERIF = percentage of input of material which is inedible fat.

PEREF = percentage of input of material which is edible fat.

PERGD = percentage of input of material which is greaves or bought-in bulk dripping.

TT = type of technology, taking a value of 1 when the plant is continuous or batch-continuous and 0 otherwise.

PS = volume of plant's total throughput ('000 tonnes per annum).

SFTS = number of 8 hour shift equivalents worked per 24 hours.

CU = reported percentage utilisation of normal weekly capacity during first half of 1983.

12. We thought it unlikely that processing costs would be independent of either the type of material processed (PERO, PERIF, PEREF, PERGD) or the type of technology employed (TT). The variable PS was intended to capture any effect on processing costs due to plant scale rather than technology. Reported 'normal' hours of working differed considerably between plants hence the variable SFTS in addition to a variable (CU) to measure the percentage utilisation of 'normal weekly capacity'.

The price models

Model 3: time series, raw material prices

13. The dependent variables are Great Britain weighted average prices[2] of soft offal, bones, inedible fat and edible fat (OF, B, IF, EF). These average prices, in £ per tonne, were calculated for each month from January 1981 to April 1983. The explanatory variables are as follows:

T1 = price of grade 1/2/3 tallow, Great Britain average for each month January 1981 to April 1983 (£ per tonne);

T2 = price of grade 4/5 tallow, Great Britain average for each month January 1981 to April 1983 (£ per tonne);

T3 = price of grade 6 tallow, Great Britain average for each month January 1981 to April 1983 (£ per tonne);

[1] In most instances the plant's transport cost per tonne of raw material was calculated by dividing the total inward transport cost reported in the plant's accounts by the tonnage of raw material *rendered* rather than the tonnage *collected* by the plant. Where significant amounts of material are in fact delivered in by collectors the plant's estimated cost per tonne of collection will appear lower than its actual value. There will thus be some variation in the dependent variable which is attributable only to measurement error.

[2] The weighted average price of, for example, offal was calculated as $\sum_{i=1}^{n} x_i p_i$, where x_i is the ith renderer's share of the total tonnage of offal processed and p_i is the average 1982 price paid for offal by the ith renderer.

MB = price of meat and bone meal, Great Britain average for each month January 1981 to April 1983 (£ per tonne);

ED = price of edible dripping, Great Britain average for each month January 1981 to April 1983 (£ per tonne);

SD1 = seasonal dummy, 1st quarter;

SD2 = seasonal dummy, 2nd quarter;

SD3 = seasonal dummy, 4th quarter;

TD = time trend.

14. We were told that raw material prices follow the prices of finished products. Hence tallow, meat and bone meal and dripping prices (T1, T2, T3, MB, ED) enter the price equations as explanatory variables. Lagged values of these variables are also included to allow for a one, two or three month delay in the response of raw material prices to changes in final product prices (the length of lag is denoted by the subscripts 1, 2 and 3). Seasonal dummies (SD1, SD2, SD3) take the value of 1 when the dummy is operating and zero otherwise, and measure expected seasonal fluctuations in raw material prices. The time trend (TD) takes account of the possible systematic influence of other factors on prices over the period.

Model 4: time series, finished product prices

15. The dependent variables are the prices of finished products (T1, T2, T3, MB, ED). The explanatory variables are:

SM = average price of soya meal for each month January 1981 to April 1983 (£ per tonne);

SO = average price of soya oil for each month January 1981 to April 1983 (£ per tonne);

PO = average price of palm oil for each month January 1981 to April 1983 (£ per tonne);

SD1 = seasonal dummy, 1st quarter;

SD2 = seasonal dummy, 2nd quarter;

SD3 = seasonal dummy, 4th quarter;

TD = time trend.

16. Soya meal, soya oil and palm oil are the main substitutes for rendered products and we were told that the rise or fall of meat and bone meal, tallow and dripping prices is determined by the movement of substitute product prices (SM, SO, PO).[1] Lagged values of SM, SO and PO are again included in the regression equation to allow for delays in response together with seasonal dummies (SD1, SD2, SD3) and a time trend (TD).

Model 5: cross-sectional, raw material prices

17. This model investigates factors underlying the variations in prices paid for raw materials between rendering plants. The dependent variables are the

[1] Information on soya meal and oil and palm oil prices was obtained from MAFF.

1982 plant average monthly prices in £ per tonne paid for soft offal, bones, inedible fat and edible fat (OFP, BP, IFP, EFP). The explanatory variables are as follows:

CP (Model 2)

R1, R2, C1 (Model 1)

OB =average size of offal consignment calculated as

$$\frac{\text{tonnage of offal processed}}{\text{number of abattoir collections}}$$

FBB =average size of fat and bone consignment calculated as

$$\frac{\text{tonnage of fat and bone}}{\text{total number of collections}}$$

VALT =total value of yield of output per tonne of input, all materials (£ per tonne)

EAW =East Anglia/Wales

SE =South-East

MD =Midlands

NE =North-East

NW =North-West

SCT =Scotland

TOTRS=percentage share of the total tonnage of material rendered in the region

ORS =percentage share of the total tonnage of offal rendered in the region.

18. We were told that the price of raw material was determined by subtracting the renderer's costs from the expected value of the yield of finished products (paragraph 4.46). Differences in processing costs (CP) and in transport cost between plants would therefore contribute to price variations. Because of probable measurement error and substantial differences in costs of collection per tonne between offal, fat and bones (paragraph 4.29), the average size of consignment of offal (OB) and fat and bone (FBB), together with radii of collection variables (R1, R2), have been included as indicators of transport costs of collection in preference to CT. Prices will be higher for delivered in material since the price paid by the renderer includes transport and other costs and the collectors' margin. The proportion of total material delivered in is indicated by C1.

19. In the absence of a more satisfactory measure of the quality of offal, fat and bones an aggregate measure, VALT, has been included as at least a rough guide to the total yield of all the material processed by the plant. Regional dummies (EAW, etc) are intended to at least take account of any systematic regional variations in the value of yields of separate raw materials and to allow as far as possible for other regional factors, including any variation in the competitive pressure on prices which is not captured by the rather imperfect indicators TOTRS and ORS (paragraph 4.18). The regional dummies take a value of 1 when the dummy is operating and zero otherwise.

Results of the regression analysis

20. The main results of the regression analysis are summarised in Table 1. Independent variables were correlated with the dependent variable in a stepwise regression. Only those independent variables with a degree of explanatory power are reported in the table. Levels of significance in excess of 90 per cent are denoted by ** and levels of significance in excess of 80 per cent by*. Where there is a high level of co-variance between two independent variables (and, therefore, difficulty in establishing their separate influences on the dependent variable) the presence of this multicollinearity is noted. The Durbin-Watson statistic (DW) is reported for the time series regressions to indicate the presence or absence of an auto-regressive error term which might bias the tests of significance. For equations 4(i) and (iv) the value of the DW statistic indicates the probable absence of an auto-regressive error term. For equations 4(i) and (iii) the DW statistic lies in the indeterminate region.

21. A measure of the overall contribution of the independent variables to explaining variance in the dependent variable is provided by R^2, the proportion of the total variance explained by the equation.

The cost models

22. Radius of collection and probably size of consignment have some influence on the transport costs of collection (Table 1, Model 1) but the overall explanatory power of the model is poor. The reason for this may be in the specification of the model but measurement error is also likely to be a contributory factor.

23. A further more detailed analysis attempted to identify and where possible correct measurement error by reference to additional data. A grouping of plants by type of material processed suggested a difference in transport costs of collection between largely offal processing plants and fat and bone processing plants. The transport costs of collection of plants processing more than 30 per cent by weight of offal averaged around £10 a tonne while plants processing almost all fat and bone averaged nearer £20 a tonne. This supports the regression result that size of consignment is a major determinant of collection costs per tonne. It also appeared to be the case that companies operating the larger offal processing plants or the larger fat and bone processing plants generally had higher transport costs per tonne than smaller plants processing similar material.

24. The explanatory power of the processing cost model is somewhat better but still rather weak (Table 1, Model 2). Measurement error may again be partly responsible but other variables which have not been quantified and included in the equation could also exert a significant influence on a plant's processing cost. Examples are the condition of the plant's machinery and equipment; the level of expenditure on environmental control; the freshness of raw material; the expertise of management.

25. The results support the view that processing costs per tonne of input are lower in continuous plants than in batch plants though the fact that many of the

TABLE 1

Summary of regression results

Model	Number of observations	Dependent variable	Explanatory variables and estimated coefficients	Percentage of variance explained	Remarks
1. Transport costs	38	CT	22·2**(1), −0·13R1**, 0·02C1*, −0·001B*	15	Multicollinearity: R1, R2
2. Processing costs	38	CP	41·7**(1), 0·29 PEREF**, 0·20 PERIF**, −11·04TI**, −0·15CU	32	Multicollinearity: PS, TT; PS, SFTS
3. Raw material prices, time series model					
(i)	28	OF	36·48**(1), 0·05MB**, 0·05MB$_1$**, −0·03MB$_2$*, 0·05T3**, 0·03T1$_1$*, 0·03T2$_1$*, 0·05T1$_3$**, 1·05SD2**, −0·36SD3*, −0·26TD**	99	With lags, 25 observations. Multicollinearity: T1, T2, T3 and current and lagged values of tallow prices; meat and bone meal prices and lagged values of tallow prices. DW−2·38
(ii)	28	B	−59·35**(1), 0·09MB**, 0·08T3**, 0·10T1$_1$**, 0·04T3$_1$*, 0·15T1$_2$, 1·21SD2**, −0·21TD**	99	See above DW−2·43
(iii)	28	IF	−38·14**(1), −0·09MB$_2$*, 0·07T1, 0·20T1$_1$**, −0·11T2$_1$*, 0·20T3**, 0·21T1$_2$, 2·57SD2**	97	See above DW−2·35
(iv)	28	EF	−65·17**(1), 0·49ED**, 0·95T3$_2$, −0·30ED$_2$**, 0·32T1$_3$**, 0·29T2$_2$**, 2·45SD1*, 4·49SD3**	87	With lags, 25 observations. Multicollinearity: ED and lagged values; ED and lagged values of T1.
4. Final product prices, time series model					
(i)	28	MB	82·07**(1), 0·19PO**, 0·53SO**, 0·31PO$_1$, 0·22SO$_1$**, 0·30PO$_2$**, 0·15PO$_3$**, 0·29SM*, −0·71SM$_1$**, 0·70SM$_2$**, 3·6SD2*, 3·18TD**	82	With lags, 25 observations. Multicollinearity: current and lagged values of PO, SO, SM; PO, T. DW−2·5
(ii)	28	T1	81·8**(1), −0·09PO, 0·83SO**, 0·89PO$_1$**, 0·33SO$_1$*, 0·56PO$_3$**, 0·51SO$_3$**, 1·38SM**, −1·67SM$_1$**, −0·32SM$_2$, 12·68SD1**, 10·45SD2**, −7·70SD3*, 3·32TD**	85	See above DW−3·25
(iii)	28	T2	−29·8(1), −0·47SO**, 0·68PO$_1$**, −0·36SO$_1$**, 0·35PO$_2$**, 0·57PO$_3$**, 0·22SO$_3$**, −0·74SM**, −0·57SM$_1$*, −0·46SM$_2$*, 0·36SM$_3$*, 9·93SD1**, −18·88SD$_2$**, 3·93TD**	90	See above DW−2·5
(iv)	28	T3	−110·82**(1), −0·38SO**, 0·62PO$_1$**, −0·31SO$_1$**, 0·31PO$_2$**, 0·63PO$_3$**, 0·93SM**, −0·67SM$_1$**, 13·06SD1**, 19·41SD$_2$**, 3·21TD**	90	See above DW−2·5
5. Raw material prices, cross sectional model					
(i)	19	OFP	3·88**(1), 0·11CP**, 0·0030B**, 0·05R2**, 0·04VALT**, −1·50SE*, −0·020RS*	68	Multicollinearity: R1, R2.
(ii)	28	BP	25·48**(1), 0·02C1, 0·03FBB**, 0·22R2*, 14·17MD**, 15·26SE**, 8·94EAW	45	Multicollinearity: R1, R2; EAW, TOTRS
(iii)	26	IFP	62·17**(1), −1·81CP**, 0·05FBB*, 0·46VALT**, 39·92SE**, 33·47SCT**, −37·78EAW*	48	

Source: MMC study.

Notes:
** =significant at 90 per cent level or above.
* =significant at 80 per cent level.
(1) =estimates of α, the intercept term (see paragraph 6).

larger plants use continuous technology and most of the smaller plants batch technology makes it difficult to establish with precision the importance of technology relative to other possible aspects of plant size.

26. The significance of high proportions of inedible or edible fat for processing costs is probably due to the higher labour costs per tonne associated with sorting material into smaller batches of homogeneous quality in order to maximise its value.

The price models

27. There is a close correlation between movements in raw material prices and final product prices (Table 1, Model 3) and between movements in final product prices and the prices of substitute products (Table 1, Model 4). It would appear that the adjustment of final product and raw material prices takes place over more than one period though it will be noted that some of the lagged variables take on a negative sign. This can probably be attributed to the rather complex inter-correlations between current and lagged values of the price variables which again makes it impossible to be confident about the relative strength of the correlation of the separate price variables with the dependent variable.

28. Both raw material and final product prices show an expected and distinct seasonal pattern given the probable monthly variations in the supply of raw material (Table 4.2) and the seasonality in the demand for dripping and lard and to some extent for tallow and meat and bone meal.

29. In the cross-sectional analysis the bone and inedible fat price models accounted for less than half of the variation in average monthly prices paid for the materials (Table 1, Model 5). The offal price model produces rather better results but with fewer observations and degrees of freedom. The very limited number of edible fat price observations (fewer than ten) meant that fewer independent variables could be included in the regression equation and as a consequence of the small number of degrees of freedom R^2 is not a very reliable measure of the real explanatory power of the equation. The edible fat price equation has not been reported in Table 1 since its only point of interest was that despite the very few observations the regional dummy, NE, emerges as significant at the 90 per cent level.

30. Processing costs and value of yield are significant variables in both the offal and the inedible fat price equations and consignment size in all three equations although only at the 80 per cent level where inedible fat price is the independent variable. The proportion of material obtained from outside a 100 mile radius of the plant is significant at the 90 per cent level in the offal price equation and at the 80 per cent level in the bone price model but in both equations the sign is positive—implying that plants pay higher prices for material transport over longer distance. This result could be due to multicollinearity between R1 and R2 (R1 is a significant variable in Model 1 and R1 and R2 are inversely related) although there might be some more genuine relationship. Knacker material is better quality offal and commands a higher price and knackers may tend to locate in rural areas distant from rendering plants. An alternative explanation, perhaps more particularly relevant to the bone price equation, could lie in the supply of material by collectors (paragraph 18) who we were told can collect over a wide area.

APPENDIX 4.2

(referred to in paragraphs 4.20 and 4.21)

The survey of abattoirs

1. In 1983 the Commission undertook a survey of abattoirs to supplement the renderers' survey. The only comprehensive register of abattoirs in Great Britain is that held by the Ministry of Agriculture, Fisheries and Food (MAFF). The information on this register is confidential. The Commission accordingly approached MAFF who in the circumstances kindly consented to select a stratified sample of abattoirs and to send out questionnaires on the Commission's behalf. The Department of Agriculture and Fisheries for Scotland kindly took similar action in respect of abattoirs in Scotland. The Commission are indebted to the Ministry and the Department for their help.

2. The size distribution of abattoirs in Great Britain is skew: abattoirs in the largest size range (with slaughterings of over 50,000 cattle or equivalent per year) accounted in 1982 (the latest year for which figures were available) for 7 per cent of the number of abattoirs and 48 per cent of the total throughput. At the other end of the scale, smaller abattoirs (with slaughterings of less than 20,000 cattle or equivalent) accounted for 82 per cent of the number of abattoirs but only 23 per cent of the total throughput. In order to make the sample as representative as possible in terms of throughput, while controlling the overall survey costs, it was decided to include in the survey all the large abattoirs (and medium-sized abattoirs in Scotland), a one in two sample of medium-sized abattoirs in England and Wales, and samples of one in ten (England and Wales) and one in four (Scotland) of the smaller abattoirs. The sampling procedure and response are summarised in Table 1.

Response

3. For large abattoirs, completed questionnaires were received from 52 per cent of those mailed in England and Wales, and these represented an estimated 51 per cent of the total throughput of that category in 1982. For Scotland replies were received from six out of nine abattoirs, representing some 89 per cent of the total throughput. For medium-sized abattoirs in England and Wales, respondents represented 54 per cent of the abattoirs mailed and 28 per cent of the total throughput of all abattoirs in this group in England and Wales. In all these cases the response was considered sufficient for analysis of the results to be worthwhile. In the other three categories response was in the range 25 to 30 per cent and these have been excluded from the analysis on the grounds of insufficient response. Even where questionnaires were returned, some questions were sometimes not answered. For reasons of space, the questionnaire is not represented here, but the nature of the questions may be derived from the analysis of the replies in paragraphs 7 *et seq.*

4. Various reasons may be put forward for the relatively low response from the smaller abattoirs. First, the questionnaire was of necessity long and detailed and smaller establishments may have been less able than larger ones to devote

TABLE 1

Survey of abattoirs

	England and Wales			*Scotland*			
	*Large**	*Medium**	*Small**	*Large**	*Medium**	*Small**	*Total of all categories*
Total throughput in 1982 ('000 cu†)	5,733	3,237	2,666	433	532	311	12,911
No of abattoirs	65	108	849	9	14	44	1,089
Sampling fraction	1 in 1	1 in 2	1 in 10	1 in 1	1 in 1	1 in 4	
No of forms despatched	65	54	85	9	14	11	238
No of completed forms received	34	29	21	6	4	3	97
As % of despatch	. (52)	(54)	(25)	(67)	(29)	(27)	(41)
Throughput of respondents as % of total throughput	(51)	(28)	(2)	(89)	(26)	(9)	(35)

Source: MMC survey and (for total throughputs) MAFF.

* Large=throughput over 50,000 cu†
Medium=throughput between 20,000 and 50,000 cu
Small=throughput less than 20,000 cu.

† cu=1 cattle unit=1 adult cattle beast=3 calves=5 sheep=2 pigs.

TABLE 2

Regional analysis of respondents in England and Wales

Standard region	*Large abattoirs* *No*	*'000 cu (1982)*	*% of total*	*Medium-sized abattoirs* *No*	*'000 cu (1982)*	*% of total*	*Totals* *No*	*'000 cu (1982)*	*% of total*
East Anglia	6	669	(23)	2	52	(6)	8	721	(19)
W Midlands	6	565	(19)	3	103	(11)	9	668	(17)
North-West	6	519	(18)	2	61	(7)	8	580	(15)
South-East	6	407	(14)	3	93	(10)	9	500	(13)
E Midlands	4	377	(13)	2	50	(5)	6	427	(11)
Yorkshire & Humberside	4	266	(9)	7	206	(22)	11	472	(12)
North	1	109	(4)	3	95	(10)	4	204	(5)
South-West	1	35	(1)	6	241	(26)	7	276	(7)
Wales	0	—	(—)	1	19	(2)	1	19	(—)
England & Wales	34	2,947	(100)	29	920	(100)	63	3,867	(100)

Source: MMC survey.

clerical and management resources to the completion of the questionnaire in the time specified. Secondly, the way in which the survey had to be carried out precluded Commission staff from pursuing a vigorous programme of reminder action.

5. There remains the possibility of bias in the results reported below for the large and medium-sized abattoirs. But it is worth noting that the respondents appear typical of their categories in terms of average size and of geographic distribution (see Table 2), so there is no reason to expect a strong bias. The throughput of these respondents in 1982 was 4,243,000 cu compared with a total throughput in Great Britain in 1982 of 12,911,000 cu. Thus the survey results reported below represent the experience of larger abattoirs collectively responsible for about one third of the total throughput of abattoirs in Great Britain. The experience of smaller abattoirs may differ.

Regional analysis of respondents in England and Wales

6. Table 2 shows an analysis by Standard Region of the replies from abattoirs in England and Wales.

Results

7. The tables and commentary that follow summarise the response (in terms of numbers of abattoirs) to the main questions in the survey.

TABLE 3

Abattoirs reporting separate recovery of glands and casings

	England and Wales				*Scotland*
	Large abattoirs		*Medium-sized abattoirs*		*Large abattoirs*
	No	*(%)*	*No*	*(%)*	*No*
Number of abattoirs reporting the separate recovery of:					
Glands	32	(94)	17	(59)	4
Casings	32	(94)	23	(79)	3
Total number of respondents	34	(100)	29	(100)	6

Source: MMC survey.

Charging for collection of animal waste

8. Twenty-five (74 per cent) of the large abattoirs and 17 (59 per cent) of the medium-sized ones in England and Wales reported that they had at some time in the last five years been charged for the collection of animal waste. The percentages reporting charges for collection of blood were somewhat lower; 17 (50 per cent) of the large and 8 (28 per cent) of the medium-sized abattoirs reported such charges. Two of the six large Scottish abattoirs in the survey reported charges for the collection of animal waste and two for the collection of blood. Another one changed renderer rather than pay to have the blood taken away.

TABLE 4

Staff employed in by-products recovery or separation of animal wastes for rendering

	England and Wales				*Scotland*
	Large abattoirs		*Medium-sized abattoirs*		*Large abattoirs*
	No	*(%)*	*No*	*(%)*	*No*
Work is done by:					
(1) Abattoir's own staff	29	(85)	19	(66)	6
(2) Renderer's staff	3	(9)	5	(17)	—
(3) Middlemen/Contractors	5	(15)	6	(21)	1
Total	34*	(100)*	29†	(100)†	6‡

Source: MMC survey.

* Two abattoirs reported using both (1) and (2), and one using (1) and (3).
† One abattoir reported using both (1) and (2).
‡ One used (1) and (3).

Ability to change renderers, middlemen or hide markets

9. Of the 34 large abattoirs 10 (29 per cent) reported that they could change renderers, middlemen or hide markets without difficulty, and 22 (65 per cent) that they could not. The corresponding numbers of medium-sized abattoirs were 5 out of 29 (17 per cent) and 19 (66 per cent). Of the six large Scottish abattoirs three reported that they could change without difficulty and three that they could not.

10. Abattoirs which reported that they could change renderers, middlemen or hide markets without difficulty less often reported having been charged for collection of animal waste in the last five years:

TABLE 5

Abattoirs' ability to change renderers: related to numbers charged for waste collection

	England and Wales			
	Large abattoirs		*Medium-sized abattoirs*	
	Could change without difficulty	*Could not change without difficulty*	*Could change without difficulty*	*Could not change without difficulty*
(*a*) Have been charged for the collection of animal waste	6	17	2	14
(*b*) Have not been charged for the collection of animal waste	4	5	3	5
(*c*) Total	10	22	5	19
(*a*) as % of (*c*)	(60)	(77)	(40)	(74)

Source: MMC survey.

Note: Two large and five medium-sized abattoirs did not reply to the question on switching.

11. In the North-West, the four large abattoirs which said they could not easily change were all charged. The two large (as well as the one medium-sized) abattoirs which reported that they could change were not charged. But in the South-East, East Anglia and East Midlands the large abattoirs tended to be charged for the collection of waste, whether or not they could switch renderers without difficulty.

12. A higher proportion of those medium-sized abattoirs answering the question on switching reported that they could not without difficulty switch renderers, middlemen or hide markets (79 per cent compared with 69 per cent for the large abattoirs). As with the large abattoirs, all respondents in the South-East and East Anglia reported being charged for the collection of animal waste. Medium-sized abattoirs stating that they were not charged were found in the South-West (three out of six), Yorkshire and Humberside (two out of seven), the North-West (1/1), North (1/2) and West Midlands (1/2). Three large abattoirs in Scotland reported that they were able to switch without difficulty, and three that they were not so able. In each category, one of the three reported being charged for the collection of animal waste.

Abattoirs carrying out rendering

13. Eight (24 per cent) large abattoirs reported carrying out rendering directly and one indirectly (ie through an associate company). Nineteen (56 per cent) had considered the possibility of carrying out rendering but only four of these still considered it a serious possibility. Of the medium-sized abattoirs, none were doing any rendering, 14 (48 per cent) had considered it, and two (7 per cent) were still seriously considering it. Three large Scottish abattoirs reported doing their own rendering directly, one did not reply, and two did no rendering. One of these had considered doing rendering, but decided against it.

TABLE 6

Type of arrangement used by abattoirs with collectors of animal waste

	England and Wales				*Scotland*
	Large abattoirs		*Medium-sized abattoirs*		*Large abattoirs*
	No	%	*No*	%	*No*
All arrangements are informal word-of-mouth	22	(65)	16	(55)	2
More than 90% are informal	2	(6)	2	(7)	—
Some are informal, some formal (ie based on written agreements or contracts)	4	(12)	1	(3)	1
More than 90% are formal	1	(3)	1	(3)	—
All arrangements are formal	5	(15)	4	(14)	3
No reply	—	(—)	5	(17)	—
Total	34	(100)	29	(100)	6

Source: MMC survey.

TABLE 7

Frequency of price agreements and payments

Interval or frequency	*Intervals at which prices are agreed*					*Frequency of payment for animal waste sold*				
	England and Wales				*Scotland*	*England and Wales*				*Scotland*
	Large abattoirs		*Medium-sized abattoirs*		*Large abattoirs*	*Large abattoirs*		*Medium-sized abattoirs*		*Large abattoirs*
	No	*(%)*	*No*	*(%)*	*No*	*No*	*(%)*	*No*	*(%)*	*No*
Weekly	7	(21)	4	(14)	2*	10	(29)	16	(55)	5*
Monthly	12	(35)	8	(28)	2*	23	(68)	7	(24)	2*
3-monthly	3†	(9)	—	(—)	—	1	(3)	—	(—)	—
As per market	12	(35)	10	(34)	2	na	na	na	na	—
No reply	—	(—)	7	(24)	1	6	(—)	6	(21)	—
Total	34	(100)	29	(100)	6	34	(100)	29	(100)	6

Source: MMC survey.

* One agreed prices, and was paid, on a mixture of weekly and monthly.
† Include one six-monthly.

TABLE 8

Frequency of collection of animal waste from abattoirs

Frequency of collection	*England and Wales*				*Scotland*
	Large abattoirs		*Medium-sized abattoirs*		*Large abattoirs*
	No	*(%)*	*No*	*(%)*	*No*
Twice a day	1	(3)	2	(7)	—
Once a day	31	(88)	24	(83)	6
Twice a week	1	(3)	—	(—)	—
Once a week	1	(6)	—	(—)	—
Did not reply	—	(—)	3	(10)	—
Total	34	(100)	29	(100)	6

Source: MMC survey.

Reliability of collection service

14. Of the larger abattoirs, 33 out of 34 reported that the service was 'very reliable' as did 25 out of 29 medium-sized abattoirs. No respondents reported the service as unreliable. No replies were received from two medium-sized abattoirs. Five of the six large Scottish abattoirs reported the service as 'very reliable', one as 'moderately reliable'.

Animal waste receipts/charges and profit

15. Respondents were asked whether the income from (or charges for) waste collected from abattoirs was important to their overall profitability. Thirty-two of the 34 large and 24 of the 29 medium-sized abattoirs in England and Wales stated that it was, as did all six of the large Scottish abattoirs.

APPENDIX 5.1

(referred to in paragraphs 5.1 and 5.19)

Companies of the PDM group and related companies as at January 1985

Location	*Name*	*Activities*
Section 1: Rendering companies		
1. Doncaster	Prosper De Mulder Ltd (Parent company)	Manufacture of meat and bone meal, of tallow, and of pet foods.
Note: 2 to 6 and 8 to 19 are subsidiary companies (wholly-owned) of 1		
2. Silvertown, London	John Knight (Animal By-Products) Ltd	Manufacture of meat and bone meal and of tallow.
3. Widnes	Granox Ltd	Manufacture of meat and bone meal and of tallow.
4. Hartshill, Nuneaton	De Mulder & Sons Ltd	Manufacture of meat and bone meal and of tallow.
5. Exeter	J L Thomas & Co Ltd	Manufacture of meat and bone meal and of tallow.
6. Gloucester	Springfields Protein Ltd	Manufacture of blood meal.
7. Leeds	P Webster Ltd (owned by PDM Pension Fund Trustees)	Manufacture of dripping.
8. Darlington	James Jennings & Co Ltd	Manufacture of dripping, sale of catering supplies and collection of animal by-products.
Section 2: Trading, collection, and knackery companies (and non-trading companies)		
9. Bridlington	G E & H Mitchell Ltd	Sale of dripping and catering supplies and collection of animal by-products.
10. Boston	Wing & Dixon Ltd	Knacker's yard.
11. Murton, nr York	S E & M Blowers Ltd	Knacker's yard.
12. Hartshill, Nuneaton	Hales (By-Products) Ltd	Collection of animal by-products.
13. Bristol	Springfields Ltd	Collection of animal by-products.
14. Wymington, Rushden	Luton & District Butchers Waste Contractors Ltd	Collection of animal by-products and waste oil.
15. Meriden, Warwickshire	Curtis (Animal By-Products) Ltd	Collection of animal by-products.
16. Sheffield	The Matlock and District Hide & Skin Co Ltd	Non-trading company.
17. Chard, Somerset	Barbers Animal Products Ltd	Non-trading company.
18. Helston, Cornwall	Haynes (Helston) Ltd	Non-trading company.
19. Pockthorpe, Driffield	Prosper De Mulder (Driffield) Ltd	Non-trading company.

Location	*Name*	*Activities*
Section 3: Associated companies		
20. Stapleford Abbotts, Essex	Stannard & Co (1969) Ltd	Collection of animal by-products and processing of waste oil.
21. Halifax	Mitchell & Broadbent (1980) Ltd	Closed down completely March 1983. (Formerly manufactured greaves and tallow.)
Section 4: Other De Mulder family-owned companies		
22. Doncaster	Frazer (Butchers) Ltd	Retail butcher.
23. Wymington and Ditchford, Nr Rushden	Chettles Ltd (subsidiary of above)	Manufacture of feather meal, and freezing of offals for supply to pet food manufacturers.
24. Doncaster	Oracle Motors Ltd	Leasing of motor cars.

Source: PDM.

APPENDIX 5.2
(referred to in paragraph 5.8)

Summary of acquisitions by PDM and related transactions

Note: This summary has been divided, as far as practicable, into two sections: (1) processing businesses and (2) other acquisitions, including collection businesses and knackers' yards. A complete division has not been possible. Where, for instance, the acquisition of a processing business and the acquisition of another kind of business (eg a collection business) were the subject of the same agreement, the details have been grouped together in section (1).

Date of acquisition*	*Nature of asset acquired*	*Name of firm acquired (names in brackets—vendors)*	*Turnover in last year before acquisition £'000*	*Consideration (amounts in brackets —goodwill when indicated) £'000*
(1) PROCESSING BUSINESSES				
1. 20.6.68	Processing business, Nuneaton.	De Mulder and Sons Ltd	570·0	145·0
2. 20.6.68 and 1.7.69	Collection of hides and skins, Darley Dale. Freehold property, motor vehicle and weighing machine.	The Matlock and District Hide and Skin Co Ltd	50·0 (15 months to 30.6.68)	1·2 72·5
3. 1.7.69	Collecting and rendering businesses at *Silvertown* and *Exeter* of John Knight Ltd/ J L Thomas & Co Ltd. Land, buildings, plant, machinery and vehicles.	(Unilever Ltd)	1,148·0 (Silvertown) 317·0 (Exeter)	370·0 (0·001) Satisfied by issue of 50,000 'B' Ordinary shares of £1 each in PDM.
4. 1.10.70	Processing business, Barnsley. Plant and machinery.	Dunnings Animal By-Products Ltd	144·7 (yr ending 31.3.70)	150·4
5. 19.4.72 (acquisition of collection activities 4.7.77—see Section (2) at 21).	Processing business, Coventry. Property, plant, machinery and motor vehicles. (Collection business retained by vendors.)	(H F Hales & Sons Ltd)	Not available	152·7 (10·0)
6. 1.7.72	Rendering business, Hull.	H Mundy & Son Ltd	51·8	32·2

* The date of acquisition is generally the effective date but in some cases may be the date of an agreement or letter.

Date of acquisition	*Nature of asset acquired*	*Name of firm acquired (names in brackets—vendors)*	*Turnover in last year before acquisition £'000*	*Consideration (amounts in brackets —goodwill when indicated) £'000*
7. 1.1.73	Business of production of degreased bone, greaves and tallow, Doncaster.	Leiner De Mulder Ltd	471·7	
8. 1.7.73	Rendering business, Bridlington and Hull	G E & H Mitchell Ltd	334·6	92·4
9. 1.7.73	Businesses of T H Watts	(T H Watts)	Not available	58·0
	(i) T H Watts—offal, fat and bone collection and processing business, Stapleford Abbotts, Essex. (No tangible assets.)			(58·0)
10. 1.7.73	(ii) Eastern Counties Bone Products Co Ltd T/A Bird Chemical Co and T H Watts—offal, fat and bone processing business, Duxford, Cambridgeshire. Plant, machinery and motor vehicles.	(T H Watts)	Not available	18·5 (8·5)
11. 1.7.73	(iii) Hunts Animal Products Ltd and T H Watts—offal, fat and bone processing business, Stratford. Leasehold property, plant, machinery and motor vehicles.	(T H Watts)	Not available	78·5 (28·5)
12. 1.7.73	(iv) Aldridge and Co Ltd and T H Watts—offal, fat and bone processing business, Colchester. Freehold property, plant, machinery and motor vehicles. (Processing activities had not commenced when business was acquired.)	(T H Watts)	Not available	70·0
13. 19.10.73	Business relating to collection and processing of edible and inedible by-products, Southampton. Plant, machinery and motor vehicles.	F H Jung & Son Ltd	Not available	110·0

Date of acquisition	*Nature of asset acquired*	*Name of firm acquired (names in brackets—vendors)*	*Turnover in last year before acquisition £'000*	*Consideration (amounts in brackets —goodwill when indicated) £'000*
14. 1.7.74	Rendering business, Derrington near Stafford. Also dealing in hides and skins.	Boons of Stafford Ltd	1,605·4	504·0
15. 14.9.74	Rendering business, Grateley, near Andover. Freehold property, plant and machinery.	National By-Products Ltd	Not available	65·0 (5·0)
16. 1.4.76	Business of knacker's yard, renderers and blood processors, Chard.	Barbers Animal Products Ltd	328·0	579·0
17. 1.4.76	Business of knacker's yard and renderers, Cury near Helston.	Haynes (Helston) Ltd	273·6	
18. 3.4.76	Business of manufacturing, rendering, processing and collection, Boston. Freehold property, plant, machinery and motor vehicles. The issued share capital of Wing & Dixon Ltd.	(W D Mark & Sons Ltd and Joseph Wing & Son (Hides) Ltd)	11·9 (Wing & Dixon Ltd—not available for Joseph Wing & Son)	40·0 (0·001)
19. 1.6.76	Business of purchasing, processing and sale of by-products, Beccles. Freehold land, buildings, plant, machinery and vehicles.	Swift & Co Ltd	Not available	230·0 (87·0)
20. 1.6.76	Business of animal by-products manufacturers and knackermen, Great Finborough. Plant, machinery and vehicles.	(B Dunning and R B Dunning)	Not available	500·0 (350·0)
21. 2.12.77	Business of processing, collection and tripe dressing, Kirkby in Ashfield. Property, plant, machinery and vehicles.	Stanley Gill	Not available	29·0
22. 1.8.78	Processing business, Bristol and Blagdon. Freehold properties, including two factories, and plant.	Springfields Ltd	2,163.1	

Date of acquisition	*Nature of asset acquired*	*Name of firm acquired (names in brackets—vendors)*	*Turnover in last year before acquisition £'000*	*Consideration (amounts in brackets —goodwill when indicated) £'000*
23.1.12.80	500 'A' Ordinary shares held by George Wedel & Son Ltd in Springfields Protein Ltd.	George Wedel & Son Ltd	Not available	Not known
24. 1.8.78	Business of collection and processing of fat and bone, Bristol. (Collection activities were taken over by Springfields Ltd.)	C Vaughan & Sons Ltd	730·5	
25. 1.8.78	Business of processing of animal by-products, Gloucester. Freehold property, plant and machinery. (At 31.7.78 the issued share capital of this company was owned by Springfields Ltd and C Vaughan & Sons Ltd. Following acquisition of these companies by PDM, the share capital of Williamsons was transferred to PDM.)	James Williamson & Son (Gloucester) Ltd.	1,052·9	
26. 1.8.78	Business of processing of animal by-products and licensed animal slaughter, Swindon. (At 31.7.78 the issued share capital of this company was owned by Springfields Ltd. Following acquisition of Springfields by PDM the share capital of Coopers was transferred to PDM.)	Coopers (Farm Services) Ltd	1,083·3	
27. 1.8.78	Business of processing of animal by-products and knacker's yard, Hendre, near Pencoed. Freehold and leasehold property. (At 31.7.78 the issued share capital of this company was owned by C Vaughan & Sons Ltd. Following acquisition of Vaughan's by PDM the share capital of Beresford's was transferred to PDM.)	A C Beresford & Sons Ltd	203·0	

	Date of acquisition	*Nature of asset acquired*	*Name of firm acquired (names in brackets—vendors)*	*Turnover in last year before acquisition £'000*	*Consideration (amounts in brackets —goodwill when indicated) £'000*
28.	23.7.79	Chettle & Sons Ltd, Wymington near Rushden, Northants. Collection and processing business, plant, machinery, vehicles etc.		371·4	481·6
29.	23.7.79	T W Mays & Sons Ltd, Bourne, Lincs. Collection and processing business, plant, machinery, vehicles, etc.	(Hypromel Products Ltd)		371·4
30.	23.7.79	Sculthorpe Slaughterers Ltd, Rushden. Business of collecting and dealing in hides and skins etc, plant, machinery and vehicles.			5·5
					(769·8)
					1,628·2
31.	16.6.80	Granox Ltd. Business of manufacture of tallow and protein feeding meals, Widnes. Leasehold and freehold property.		7,387·0	705·4
32.	16.6.80	S E & M Blowers Ltd. Business of slaughtering, knackery and production of animal by-products, Murton, Yorks. Freehold property.	(S & W Berisford Ltd)	155·6	
33.	22.9.80 (date of letter)	Rendering business, Grimsby. Plant, machinery, motor vehicles etc.	North Lincs Cattle By-Products Ltd	Not available	60·0

Date of acquisition	*Nature of asset acquired*	*Name of firm acquired (names in brackets—vendors)*	*Turnover in last year before acquisition £'000*	*Consideration (amounts in brackets —goodwill when indicated) £'000*
Business now controlled by Chettles Ltd				
23.7.79	Chettles Feather & Hair Products Ltd, Ditchford. Business of collection and processing of poultry feathers and hair into feather meal is operated from freehold premises at Ditchford. Plant and machinery, tractors, fork lifts, trailers, vehicles, freehold property and stocks.	(Hypromel Products Ltd)		436·4
23.11.79	Samuel Bates (Northampton) Ltd. Business of collection of red offal for freezing and supply to pet food manufacturers is operated from Wymington. Plant, machinery and vehicles.			164·9 (400·0)
				1,001·3
Processing businesses purchased by PDM Pension Fund Trustees				
1.7.77	Rendering and collection business also abattoir facilities, operating from Cupar and Loanhead, Fife, Scotland. (Sold in 1981.)	Frank Gysels Ltd	Not stated	273·5
5.81	Production of dripping for supply to catering trade, Beeston, Leeds.	P Webster Ltd	Not stated	Not stated
(2) OTHER ACQUISITIONS (INCLUDING COLLECTION BUSINESSES AND KNACKERS' YARDS)				
Note: Some of the following businesses merged with other PDM businesses.				
1. 1.7.69	Motor transport company. (Owned by members of the De Mulder family. Leases cars to PDM.)	Oracle Motors Ltd	15·4 (11 mths to 30.6.69)	2·6
2. yr ending 31.3.72	Bone collection round, Exeter—no tangible assets.	(E Pearse & Co Ltd)	Not available	1·6 (1·6)
3. 1.4.72	Offal, fat and bone collection business near Halifax, drums and containers.	(Peter Smith)	Not available	2·1

Date of acquisition	*Nature of asset acquired*	*Name of firm acquired (names in brackets—vendors)*	*Turnover in last year before acquisition £'000*	*Consideration (amounts in brackets —goodwill when indicated) £'000*
4. 1.4.72	Businesses at Tyddyn Daniel, Marchwiel near Wrexham and Ffridd Carw, Bangor. Offal, fat and bone collection round, knacker's yard, land, plant and motor vehicles.	(C E Clutton and T E Clutton)	Not available	110·0 (73·5)
5. 19.4.72	Collection business, Blackrod and motor vehicles.		Not available	77·6 (58·4)
6. 1.5.72	Company had ceased trading prior to acquisition—only asset was freehold property at Bury. (The company whose name was subsequently changed to John Knight (Animal By-Products) Ltd, now operates the Silvertown plant.)	J Sherlock Ltd	2·7 (yr ending 31.10.70) (Adverse balance on profit and loss account at 31.10.70 —£12,024.)	Not stated
7. 1.7.72	Bone collection round, Barnstaple—no tangible assets.	(E Pearse & Co Ltd)	Not available	0·6 (0·6)
8. 28.9.72	Plant and machinery.	(Hull Hide and Skin Co Ltd)	Not available	5·9
9. 30.9.72	Knackery business, Flint.	(I P Johnson)	Not available	3.5 (3·5)
10. 1.10.72	Wholesale and retail sale of dripping.	Wear Refining Co Ltd	137·3	19·5 (by James Jennings & Co Ltd)
11. 1.1.73	Knackery and collection business, Huntingdon, plant, machinery and motor vehicles.	G W Hopwood & Sons	Not available	15·0 (0·5)
12. 10.2.73	Knacker and boneman business, Gwespyr, Holywell, Flint,—no tangible assets.	(Mr C Booth)	Not available	0·3 (0·3) Purchased by PDM T/A Cluttons Animal By-Products.

Date of acquisition	*Nature of asset acquired*	*Name of firm acquired (names in brackets—vendors)*	*Turnover in last year before acquisition £'000*	*Consideration (amounts in brackets —goodwill when indicated) £'000*
13. 12.1.74	Bone collection round, Grantham—no tangible assets.	John Lee & Son (Grantham) Ltd	Not available	12·5 (12·5)
14. yr ended 31.3.74	Items of plant and machinery.	A Parker & Sons Ltd	Not applicable	15·0
15. 6.5.74	Hull Dripping Co Ltd—no tangible assets.	The Hull Hide, Skin and Fat Co Ltd.	Not available	4·5 (4·5)
16. 6.5.74	Bone collection rounds, Anglesey—no tangible assets.	Ellesmere Animal Products	Not available	6·3 (6·3)
17. 18.10.74	Assorted items of processing plant.	(H Heginbottom & Sons)	Not applicable	10·0
18. 15.7.75	Offal collection round, Sutton Coldfield, lorry and containers.	(J Pegg)	Not available	14·4 (0·1)
19. 1976	Offal, fat and bone collection round, and 2 motor vehicles.	A A Jennings	Not available	1.0 (0·1)
20. 1976	Offal, fat and bone collection round and 2 motor vehicles.	N Warren	Not available	2·0 (0·2)
21. 4.7.77	Offal, fat and bone collection business, Coventry, share capital of Hales (By-Products) Ltd and plant and vehicles. (Hales (By-Products) Ltd was incorporated on 15.3.77 and commenced to trade on 4.7.77 when it took over the offal, fat and bone collection purchased on that date by PDM from H F Hales & Sons Ltd, H F Hales and R W Hales. It now operates from Hartshill.)	(H F Hales & Sons Ltd, H F Hales and R W Hales)	Not available	600·0 (560·0)
22. 1977 (letter dated 23.11.77)	By-products plant and equipment.	(Sheffield Corporation)	Not applicable	21·0
23. 1.8.78	Fat and bone collection round—no tangible assets.	A D Forsey Ltd	Not available	13·0 (13·0)
24. 23.7.79	Collection business.	Luton and District Butchers Waste Contractors Ltd.	959·4	380·3

Date of acquisition	*Nature of asset acquired*	*Name of firm acquired (names in brackets—vendors)*	*Turnover in last year before acquisition £'000*	*Consideration (amounts in brackets —goodwill when indicated) £'000*
25. 26.11.79	Collection business and motor vehicle.	(F Smith & Son)	Not available	4·0 (2·0)
26. 30.12.80	Fat and bone collection business and motor vehicle.	(T H Brackenbury)	Not available	2·0 (Paid by John Knight) (1·4)
27. 26.6.81	Fat and bone collection business and motor vehicle.	(J Ansell)	Not available	2·9 (Paid by John Knight) (1·5)
28. 1984	Collection business, Meriden.	Curtis (Animal By-Products) Ltd	Not available	

APPENDIX 5.3

(referred to in paragraph 5.15)

Processing businesses acquired by PDM where processing was subsequently discontinued or had ceased and was not restarted

Business	*Location*	*When acquired*	*When processing stopped (where known)*	*Disposal of plant or site*
1. Dunnings Animal By-Products Ltd	Barnsley	October 1970	September 1971	Most plant scrapped, some transferred.
2. H F Hales & Sons Ltd	Coventry	April 1972	Not stated	Plant and machinery disposed of.
3. H Mundy & Son Ltd	Hull	July 1972	On eve of acquisition	Plant, machinery and freehold property subsequently sold.
4. Leiner De Mulder Ltd (already half-owned)	Doncaster	January 1973 (other half share)	June 1975	Some plant transferred to PDM, some scrapped.
5. G E & H Mitchell Ltd	Bridlington and Hull	July 1973	Production of dripping ceased soon after acquisition.	In 1975 and 1979 property in Hull sold to light engineering contractors. An extractor had been sold; remaining plant is still in use.
6. (a) Eastern Counties Bone Products Co Ltd T/A Bird Chemical Co and T H Watts	Duxford	July 1973	Shortly after acquisition	Plant and machinery scrapped.
(b) Hunts Animal Products Ltd and T H Watts	Stratford	July 1973	April 1977	Cooker & boilers sold, remaining equipment transferred or scrapped. The company is negotiating to sublet to a company unconnected with by-products.
7. F H Jung & Son Ltd	Southampton	October 1973	Not stated	Plant and machinery removed. Major part installed at Exeter.
8. Boons of Stafford Ltd	Derrington nr Stafford	July 1974	August 1980	Thereafter ground meal produced elsewhere in PDM group until March 1982.

	Business	*Location*	*When acquired*	*When processing stopped (where known)*	*Disposal of plant or site*
9.	National By-products Ltd	Grately nr Andover	September 1974	Not stated	No processing took place after acquisition but some equipment was used to 'melt out' waste fat.
10.	Barbers Animal Products Ltd	Chard	April 1976	Operated as before until June 1977, thereafter until November 1978 on a reduced scale—mainly confined to feather meal.	PDM still owns freehold property and plant and machinery.
11.	Haynes (Helston) Ltd	Cury nr Helston	April 1976	April 1977—until then, continued in full production.	Bulk of plant and machinery scrapped.
12.	Joseph Wing & Son	Boston	April 1976	April 1977—until then, continued in full production.	Bulk of plant and machinery transferred to Doncaster.
13.	Swift & Co Ltd	Beccles	June 1976	Prior to acquisition	Plant and machinery transferred and property sold during 1977–78.
14.	B Dunning and R B Dunning	Great Finborough	June 1976	Prior to acquisition	Plant and machinery transferred or stored.
15.	Stanley Gill	Kirby in Ashfield	December 1977	Not stated	Plant and machinery scrapped. Property sold in 1978–79.
16.	Springfields Ltd	(a) Bristol (bone meal)	August 1978	August 1980	Some plant transferred.
		(b) Blagdon (blood meal)	August 1978	April 1980—blood meal production transferred to Gloucester.	Some plant transferred, remainder scrapped.
17.	C Vaughan and Sons Ltd	Bristol	August 1978	October 1978	Plant and machinery transferred to Doncaster: some items used, rest sold.
18.	James Williamson & Son (Gloucester) Ltd	Gloucester	August 1978	April 1979	Plant and machinery transferred to PDM. From October 1979, has processed blood for Springfields Protein Ltd.
19.	Coopers (Farm Services) Ltd	Swindon	August 1978	November 1978	Plant and machinery transferred to Doncaster; some items utilised elsewhere. Lease expired December 1980.

Business	*Location*	*When acquired*	*When processing stopped (where known)*	*Disposal of plant or site*
20. A C Beresford & Sons Ltd	Hendre nr Pencoed	August 1978	March 1981	Plant was transferred or scrapped. In 1982 the freehold property was sold.
21. Chettle & Sons Ltd	Wymington nr Rushden	July 1979	March 1980—processing had until then been continued as PDM Ltd T/A Chettle & Sons.	Plant and machinery still on site.
22. T W Mays & Sons Ltd	Bourne	July 1979	March 1980—processing had until then been continued as PDM Ltd T/A T W Mays & Sons.	Plant and machinery transferred to Doncaster.
23. North Lincs Cattle By-Products Ltd	Grimsby	September 1980	Prior to acquisition	Most of plant and machinery used, sold or scrapped.

Source: PDM

APPENDIX 5.4

(referred to in paragraph 5.35)

Table 1

PDM: raw material throughputs 1970–71 to 1976–77

tonnes

	Financial year							
	1970–71 (52 weeks)		*1972–73 (52 weeks)*		*1974–75 (52 weeks)*		*1976–77 (53 weeks)*	
	*Greaves**	*Raw material*	*Greaves**	*Raw material*	*Greaves**	*Raw material*	*Greaves**	*Raw material*
Doncaster								
—solvent plants	30,013		22,956		15,951		5,684	
—cooking plant		20,949		19,240		20,974		81,128
—bone plant		18,986		4,434		14,770		
—fat plant		5,532		10,566		17,761		13,705
Nuneaton/Hartshill		31,773		72,527		114,240		89,176
Driffield		22,663		30,126		45,948		28,870
Darlington		1,849		2,024		4,422		3,969
Exeter		20,812		20,644		21,674		23,023
Barnsley				2,093				
Stafford						15,042		58,099
Stratford, London						26,883		7,357
Haynes, Helston								6,805
Barbers, Chardstock								8,343
Silvertown, London								
Widnes								
Gloucester—blood								
Total throughput		122,564		161,654		281,714		320,475
Average per week		2,357		3,109		5,418		6,047

Source: PDM.

* Greaves purchased from outside PDM for processing in the group's solvent extraction plants.

TABLE 2

PDM: raw material throughputs 1979–80 to 1983–84

tonnes

	Financial year				
	1979–80 (52 weeks)	*1980–81 (52 weeks)*	*1981–82 (52 weeks)*	*1982–83 (53 weeks)*	*1983–84 (52 weeks)*
	Raw material	*Raw material*	*Raw material*	*Raw material*	*Raw material*
Doncaster					
—solvent plants					
—cooking plant	130,320	114,829	91,346	95,768	105,397
—bone plant					
—fat plant	23,494	18,669			
Nuneaton/Hartshill	112,705	106,771	96,847	98,991	102,293
Driffield	43,282	35,266	10,194		
Darlington	4,787	5,112	4,474	5,739	6,084
Exeter	49,666	58,037	55,498	59,747	62,699
Barnsley					
Stafford	54,990	17,073			
Stratford, London					
Haynes, Helston					
Barbers, Chardstock					
Silvertown, London		56,587	92,060	122,452	140,906
Widnes		81,572	121,994	105,991	94,603
Gloucester—blood			31,119	39,125	39,936
Total throughput	419,244	493,916	503,532	527,813	551,918
Average per week	8,062	9,498	9,683	9,959	10,614

Source: PDM.

Note: Figures for Webster, acquired by the PDM Pension Fund Trustees in May 1981 (see paragraph 5.20) are not included in this table. Webster's throughput was below 2,000 tonnes in 1981–82 and 1982–83.

APPENDIX 5.5

(referred to in paragraph 5.42)

PDM: calculation of average capital employed based on historical cost accounts

£'000

	Year ended 31 March												
	1972	*1973*	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*	*1981*	*1982*	*1983*	*1984*
Fixed assets	2,007	2,310	3,648	5,430	5,494	6,891	7,702	10,949	12,470	15,061	14,733	13,838	13,944
Current assets*	907	1,178	2,180	2,289	2,316	3,511	3,376	5,405	6,116	6,872	5,719	7,018	8,880
	2,914	3,488	5,828	7,719	7,810	10,402	11,078	16,354	18,586	21,933	20,452	20,856	22,824
Less current liabilities† and ‡	535	798	2,028	2,283	2,687	3,954	3,916	5,151	3,822	4,308	3,904	5,658	10,193
Capital employed§	2,379	2,690	3,800	5,436	5,123	6,448	7,162	11,203	14,764	17,625	16,548	15,198	12,631
Average capital employed		2,534	3,245	4,618	5,279	5,785	6,805	9,182	12,983	16,195	17,086	15,873	13,914

Source: PDM and MMC study.

* Current assets include stock, debtors, cash and corporation tax recoverable.
† Current liabilities include creditors, directors' current accounts and current taxation.
‡ Excluded from current liabilities are hire purchase, bank overdrafts, secured loans, unsecured loans, bank loans and proposed dividend.
§ Investments in associated companies, unquoted investments, mortgage loans, hire purchase contracts and goodwill are excluded from capital employed.

APPENDIX 5.6

(referred to in paragraph 5.45)

PDM: some major items of capital expenditure 1978 to 1984

Plant and machinery

		£'000*
Doncaster factory		
1978	Grinding plant	83
	Effluent plant	129
	Carver Greenfield plant	88
1979	Grinding plant	50
	Carver Greenfield plant	71
1982	Carver Greenfield plant	73
1984	Blood plant	57
	Odour control	33
Hartshill factory		
1978	Odour control	54
	Blood drier	53
1979	Odour control	100
	Grinding plant	69
1983	PB24 crusher and feed system	63
	Odour control	19
1984	Odour control	49
Exeter factory		
1978	Odour control	75
	Re-organisation of cooking system and press installation	87
1979	Re-organisation of cooking system and press installation	290
	Grinding plant	114
	Odour control	42
1980	Re-organisation of cooking system and press installation	50
1981	Odour control	96
1982	Odour control	137
	Effluent plant	77
1984	Rotodisc drier	363
Gloucester factory		
1980	Blood processing plant	296
1981	Blood processing plant	55
	Odour control	15
1982	Odour control	31

Widnes factory

1981	Stork Duke equipment	46
	Odour control	20
1982	Odour control	172
1983	Odour control	123

Source: PDM.

* All figures rounded.

APPENDIX 5.7

(referred to in paragraph 5.45)

PDM: some major items of capital expenditure 1978 to 1984

Buildings

			£'000*
1978	Doncaster	Carver Greenfield Building	41
	Exeter	Factory extension	67
1979	Doncaster	Miscellaneous improvements	65
	Exeter	Factory extension	82
	Thriplow	New collection depot	138
1980	Doncaster	Miscellaneous improvements	39
	Coventry	New garage	31
	Thriplow	New collection depot	11
	Gloucester	Miscellaneous improvements	26
1981	Doncaster	Miscellaneous improvements	40
	Coventry	New garage	7
1982	Doncaster	Miscellaneous improvements	34
1984	Silvertown	New garage and lorry park	73

Source: PDM

* All figures rounded.

APPENDIX 6.1

(referred to in paragraphs 6.37 and 7.93)

Complaints about PDM

1. (*a*) One renderer named a number of suppliers to whom he had been paying prices which were 'no lower than the norm' for fat, bone and offal. Subsequently, he had been forced to pay what he regarded as uneconomic prices in an attempt, in most cases unsuccessful, to retain the supplies. He alleged that this price escalation had been initiated by PDM which, in some cases, had offered suppliers prices which were much higher than the renderer was paying and higher than PDM was paying elsewhere. In some cases where the renderer had raised the price to counter PDM's offer, PDM had retaliated by offering even higher prices.

   (*b*) PDM said that it had not started the 'price war'. PDM named five suppliers which it alleged it had lost to another renderer (not the complainant) and one contract it had lost to the complainant before the dates of PDM's offers as reported to us by the complainant. PDM told us that it was the last-mentioned loss that had decided PDM to try to recover its overall losses even though, as a result of experience in a previous 'price war', it had been reluctant to be drawn into another.

2. (*a*) Another renderer told us that when he commenced business in 1975 he offered potential suppliers prices which he had assessed to be economic and higher than those offered by PDM. This appeared to be confirmed by their eager acceptance by the suppliers. The renderer said that PDM then made counter-offers to the suppliers at prices much higher than those offered by the new entrant. The renderer had been told that one abattoir was paid a fixed sum per week regardless of the number of cattle actually killed.

   (*b*) PDM said that the complaint emanated from members of a family that had been running certain businesses sold to PDM some years earlier. They had then worked for PDM but had subsequently left and set up in business in competition with the businesses that had been sold to PDM. They knew precisely what prices PDM was paying suppliers and had used this information to compete for supplies. PDM had taken what steps it considered necessary to retain its suppliers, but had in fact lost some.

3. (*a*) Another renderer said he believed that some complaints about smells from his plant had been made as a result of suggestions by PDM. The renderer also, without actually naming PDM, expressed his belief that tie-in transactions existed in the collection of animal waste, on the lines that 'unless we get your fat and bones, we don't take your offal' (in a situation where the abattoir could have got better prices for its fat and bones from other purchasers).

(*b*) PDM said that there were environmental problems at the plant in question, that complaints had been made by local residents, but that PDM had never encouraged such complaints. On the second point, PDM stated that it never made it a condition for the collection of a supplier's offal that it should also receive that supplier's fat and bones.

BMMA

4. (*a*) The Bacon and Meat Manufacturers' Association said that its members found the service efficient but expressed grave concern at what was perceived to be a monopoly situation. There was suspicion about pricing policies and a common worry about the national capacity for dealing with animal waste, especially if further concentration should take place and services were withdrawn in pursuit of a price policy, for logistical reasons or because of industrial action or business failure.

(*b*) PDM stated that any suspicions which some members of the association might have about PDM's pricing policies were ill founded. The company did have a national capacity for dealing with animal waste and indeed had set out to achieve that situation as part of its corporate policy. Its plants needed minimum quantities of material to be profitable and it would therefore be commercial suicide for it to stop collecting material. Its business was financially sound and its relationship with its workforce was good.

Licensed animal slaughterers

5. (*a*) Licensed animal slaughterers who deal with dead, diseased or injured animals, unsuitable for human consumption, expressed the fear that, if there were a further contraction of the number of companies in the rendering trade, licensed slaughterers could, in price negotiations, find themselves at the mercy of big renderers.

(*b*) PDM stated that it was anxious to maintain its supplies of raw material and, in order to do this it paid the market price. It was not correct to suggest that it paid less than the market price for the material which it had obtained from licensed slaughterers.

APPENDIX 7.1

(referred to in paragaphs 7.36 and 7.68)

Products sold by PDM

Meat and bone meal
Meat meal
Poultry meal
Blood meal
Blended meal
Greaves
Fat greaves
Bulk dripping
Tallows—grades 1 to 6
Feed tallows
Recovered vegetable oil
Hides and skins
Tripe
Pig and beef pancreas
Livers, lungs, and hearts
Knacker meat—cooked and raw
Raw materials for rendering
Canned pet food

Source: PDM.

Index

References are to paragraph numbers, not page numbers

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