

**SCOTTISH FOOD ENFORCEMENT LIAISON
COMMITTEE**

REPORT OF THE FOOD STANDARDS

SUB-COMMITTEE

SURVEY SF1

SURVEY OF

FAT CONTENT, SULPHUR DIOXIDE

AND MEAT SPECIES

PRESENT IN MINCED MEAT SOLD IN SCOTLAND

DURING 2000 to 2002

Report Prepared by:

Dr Andrew C Mackie
City of Edinburgh Council
October 2005

SURVEY OF
FAT CONTENT, SULPHUR DIOXIDE AND MEAT
SPECIES
PRESENT IN MINCED MEAT SOLD IN SCOTLAND
DURING 2000 to 2002

1 Introduction

- 1.1 This survey was initiated by the Scottish Food Enforcement Liaison Committee (SFELC) through its Food Standards Sub-Committee (FSSC) to review data on the fat content, sulphur dioxide and meat species of minced meat on sale throughout Scotland during the period 2000 to 2002.
- 1.2 The SFELC was set up in 2002 with the purpose of co-ordinating specific issues relevant to the enforcement of the Food Safety Act 1990.
- 1.3 The Committee provides a forum for the discussion of topics relevant to current problems and may initiate surveys or projects or co-ordinate specific investigations initiated by the Local Food Liaison Groups that have been set up in five geographical areas.
- 1.4 Membership comprises Public Analyst, Environmental Health Officers, professional groups, consumer and industry representatives and the Food Standards Agency Scotland.
- 1.5 The Committee acts under the following terms of reference:
 - a) contribute to the development of the FSA strategies in Scotland to improve their effectiveness
 - b) aid and contribute to the consistency of Local Authority Food Law Enforcement in Scotland
 - c) consider new enforcement mechanisms and approaches and produce recommendations for implementation
 - d) assist in the maintenance of an effective enforcement infrastructure
 - e) consider all other relevant matters relating to food and animal feeding stuffs
 - f) consider any other issues relevant to the way the Food Standards Agency works with Local Authority enforcement
 - g) comment on draft legislation and guidance produced by the Food Standards Agency
 - h) review the work of the Sub-committees, working parties, and any other groups set up under the auspices of the Scottish Food Enforcement Liaison Committee
- 1.6 The Food Standards Sub-Committee of SFELC considers matters relating to food labelling and compositional standards and co-ordinates all national food surveillance projects, including microbiology, on behalf of enforcement authorities in Scotland.

2 Summary

- 2.1 All of the data on the fat content, sulphur dioxide and meat species of samples of minced meat analysed in the four Public Analyst laboratories in Scotland during the period 2000 to 2002 have been collated in this report.
- 2.2 The statutory standards for the fat content of minced meat contained in the Minced Meat and Meat Preparations (Hygiene) Regulations 1995 apply to only a small proportion of minced meat sold in Scotland. Therefore, the data obtained in this survey have been evaluated so that recommendations for the maximum acceptable fat content of various types of minced beef on sale in Scotland can be produced.
- 2.3 The average and range of fat contents for minced beef (standard and lean), pork mince, lamb mince and poultry mince samples analysed in Scotland during 2000 to 2002 are reported.
- 2.4 The average fat content of minced beef sold in 2000 and 2001 has reversed the downward trend noted in previous surveys. However, in the 2002 survey the average fat content had reverted to the lower value found in previous surveys. The fat contents of the small number of pork and lamb mince samples were satisfactory.
- 2.5 Poultry mince (chicken and turkey) has been found to contain relatively high levels of fat, which indicates the inclusion of a significant amount of poultry skin in the mince. However, the numbers of samples of chicken and turkey mince were small.
- 2.6 Of a total of 319 samples of minced beef examined for meat species 5.6 per cent were found to contain soluble proteins consistent with the presence of a species of meat other than beef.
- 2.7 Of a total of 14 samples of 'other' mince examined for meat species 5 samples (35.7%) were found to contain soluble proteins consistent with the presence of a species of meat other than that indicated or inferred by the name applied to the mince when sold. However, the number of samples was small and the test method is very sensitive. Therefore, these findings should be treated with caution.
- 2.8 Of a total of 1274 samples of minced meat (standard and lean beef mince and "other" mince) 26 (2.0 per cent) samples contained sulphur dioxide preservative.

3 Background – Previous Surveys

- 3.1 Because of its position as a distinctive feature of the Scottish diet, the quality of minced meat (or as it is more commonly referred to, "mince") is of interest to local authorities responsible for monitoring and enforcing food standards. It is expected by customers and accepted by suppliers that, unless the name clearly indicates otherwise, minced meat is prepared only from beef.
- 3.2 In the absence of any statutory standard for the fat content of minced meat there have been attempts by Public Analysts to prescribe a level of fat which

could be considered, in their opinion, as the maximum acceptable for minced meat prepared from cuts of normal commercial quality.

- 3.3 In support of this opinion five surveys^{1 2 3 4 5} of the fat content of minced meat have been organised previously by the Food Standards Sub-Committee of the Scottish Food Co-ordinating Committee (the predecessor committees of FSSC and SFELC, respectively).
- 3.4 The results of these previous surveys are summarised in Table 1a (Standard Beef Mince), Table 1b (Lean Beef Mince) and Table 1c ("Other" Mince – mince prepared from meat other than beef).
- 3.5 Although the species of meat present in samples of mince has been checked for many years it was included for the first time in the 1997 survey.
- 3.6 In the past it has been found occasionally that meat other than beef had been included in mince without it being indicated in the name applied to the food.
- 3.7 As a consequence of the general public's widespread fears over Bovine Spongiform Encephalopathy (BSE) there has been an increase in the availability of minced meat prepared from species other than beef ("other" mince). Concerns have been expressed that the species substitution practice referred to above may have been reversed with beef being included in "other" minces.
- 3.8 In the 1997 survey, from a total of 198 samples of standard and lean mince, 7 samples (3.5 per cent) were found to contain soluble proteins consistent with the presence of pork meat and a further one sample contained soluble proteins consistent with the presence of lamb meat. Out of a total of 20 samples of "other" mince, one sample of pork mince and one sample of lamb mince were found to contain soluble proteins consistent with the presence of beef.
- 3.9 In the 1998 survey, from a total of 204 samples of standard and lean mince, only 3 samples (1.5 per cent) were found to contain soluble proteins consistent with the presence of pork meat.

Also in this survey, out of a total of 9 samples of lamb mince, one sample was found to contain soluble proteins consistent with the presence of beef. None of the 21 samples of poultry and pork mince were found to contain other meat species.

- 3.10 In the 1999 survey, from a total of 300 samples of standard and lean mince, 12 samples (4.0 per cent) were found to contain soluble proteins consistent with the presence of pork meat and 2 samples were found to contain soluble proteins consistent with the presence of lamb.

¹ Survey of the Fat in Minced Meat in Scotland – Scottish Food Co-ordinating Committee 1988

² Survey of the Fat Content in Minced Meat in Scotland, 1993 – Scottish Food Co-ordinating Committee 1994

³ Survey of the Fat Content of Minced Meat Sold in Scotland, 1995-1996 – Scottish Food Co-ordinating Committee 1998

⁴ Survey of the Fat Content and the Meat Species Present in Minced Meat Sold in Scotland During 1997 – Scottish Food Co-ordinating Committee 1999

⁵ Survey of the Fat Content and the Meat Species Present in Minced Meat Sold in Scotland During 1998-1999 – Scottish Food Enforcement Liaison Committee 2002 (in press)

Also in this survey, out of a total of 30 samples of lamb mince, 4 samples were found to contain soluble proteins consistent with the presence of beef and a further 1 sample was found to contain soluble proteins consistent with the presence of pork. None of the 10 samples of pork mince were found to contain other meat species but one of the 26 samples of poultry mince was found to contain soluble proteins consistent with the presence of beef.

3.11 Prior to 1977, the Regulations then in force in Scotland allowed mince to contain up to 450 milligrams per kilogram of sulphur dioxide during the months of June to September. The presence of sulphur dioxide preservative in foods is currently controlled by the Miscellaneous Food Additives Regulations 1995⁶, which do not permit the addition of sulphur dioxide preservative to minced meat. However, due to the original dispensation the non-permitted addition of sulphur dioxide to mince has continued occasionally to be found to occur.

3.12 The SFCC has monitored the situation since the change in the legislation by conducting surveys. The results of this monitoring programme have been presented as a series of reports^{7 8 9 10} published in 1993, 1998, 1999 and 2000.

These surveys reported that the addition of sulphur dioxide to mince continued to occur in a small number of samples at levels ranging from 19 mg/kg up to 5000 mg/kg. The results of previous surveys are summarised in Table 3.

4 Sampling and Analysis

4.1 Samples of minced meat were obtained during 2000 to 2002 by Environmental Health Officers as part of their routine food law enforcement work. Samples were submitted for analysis to the Public Analyst laboratories based in Aberdeen, Dundee, Edinburgh and Glasgow. A total of 435 samples of minced meat were taken in 2000, 428 samples in 2001 and 422 samples in 2002.

4.2 Analysis was carried out to determine the fat content, sulphur dioxide and meat species using validated and UKAS accredited test methods. Analysis was carried out as part of each laboratory's agreed programme with client Environmental Health Departments, consequently all three parameters were not determined on all samples.

⁶ Miscellaneous Food Additives Regulations 1995; Statutory Instruments 1995 No 3187, HMSO

⁷ Survey of Sulphur Dioxide Preservative in Minced Meat in Scotland 1988-1992 – Scottish Food Co-ordinating Committee 1993

⁸ Survey of Sulphur Dioxide Preservative in Minced Meat in Scotland 1997 – Scottish Food Co-ordinating Committee 1998

⁹ Survey of the Fat Content of Minced Meat Sold in Scotland, 1998 – Scottish Food Co-ordinating Committee 1999

¹⁰ Survey of the Fat Content of Minced Meat Sold in Scotland, 1999 – Scottish Food Co-ordinating Committee 2000

5 Results – Fat Content

- 5.1 The results of analysis for fat content for the samples collected in 2000 are summarised in Table 2a, for 2001 in Table 2b and for 2002 in Table 2c.

Frequency distributions of the fat content results for 2000 are presented in Charts 1a to 1e, for 2001 in Charts 2a to 2d and Charts 3a to 3e for 2002.

- 5.2 In the 2000 survey a total of 240 samples of standard minced beef and 13 samples of lean minced beef were analysed for fat content. In addition, samples of lamb mince (13 No.), chicken mince (11 No.), turkey mince (10 No.), pork mince (3 No.) and venison mince (1 No.) were tested for fat content.

Fat contents of standard minced beef ranged from 2.3% to 31.4% and the fat content of lean minced beef ranged from 7.1% to 18%. The fat contents of turkey mince ranged from 4.3% to 6.1%, lamb mince ranged from 6.3% to 23.9%, chicken mince ranged from 5.35% to 11.0%, pork mince ranged from 3.4% to 14.9% and the single sample of venison had a fat content of 3.2%.

- 5.3 In the 2001 survey a total of 196 samples of standard minced beef and 17 samples of lean minced beef were analysed for fat content. In addition, samples of turkey mince (4 No.), lamb mince (4 No.), chicken mince (1 No.) and pork mince (1 No.) were tested for fat content.

Fat contents of standard minced beef ranged from 2.6% to 44.1% and the fat content of lean minced beef ranged from 4.1% to 14%. The fat contents of turkey mince ranged from 5.0% to 6.8%, lamb mince ranged from 10.8% to 23.3%, and the single samples of chicken mince and pork mince had fat contents of 4.7% and 7.5%, respectively.

- 5.4 In the 2002 survey a total of 169 samples of standard minced beef and 26 samples of lean minced beef were analysed for fat content. In addition, samples of turkey mince (5 No.), lamb mince (6 No.), chicken mince (1 No.) and pork mince (2 No.) were tested for fat content.

The fat contents of standard minced beef ranged from 0.6% to 25.9% and the fat contents of lean minced beef ranged from 5.8% to 18.5%. The fat contents of turkey mince ranged from 4.0% to 13.5%, lamb mince ranged from 10.6% to 29.9%, the single sample of chicken mince had fat contents of 14.0% and the two samples of pork mince had fat contents of 12.3% and 15.2%, respectively.

6 Results – Meat Species Identification

- 6.1 In the 2000 survey a total of 148 samples of standard and lean minced beef were analysed for meat species. Of these 3 samples (2 per cent) were found also to contain soluble proteins consistent with the presence of pork meat and 3 samples (2 per cent) were found also to contain soluble proteins consistent with the presence of lamb meat. None of the samples were found to contain soluble proteins consistent with the presence of poultry meat. Thus 6 samples (4 per cent) were found to contain 'foreign' meat.

- 6.2 In 2000, out of 5 samples of lamb mince, one sample was found to contain soluble proteins consistent with the presence of beef and lamb, one sample contained soluble proteins consistent with the presence of beef and pork, but no lamb, and a third sample contained soluble proteins consistent with the presence of beef, but no lamb. None of the 3 samples of pork, turkey and venison minces were found to contain other meat species.
- 6.3 In the 2001 survey a total of 112 samples of standard and lean minced beef were analysed for meat species. Of these 2 samples (2.0 per cent) were found also to contain soluble proteins consistent with the presence of pork meat. None were found to contain lamb/mutton or poultry meat.
- 6.4 In 2001 only two samples of "other" mince were submitted for identification of meat species. Both samples were found to contain only soluble proteins consistent with their description.
- 6.5 In the 2002 survey a total of 59 samples of standard and lean minced beef were analysed for meat species. Of these, 4 samples (7 per cent) were found also to contain soluble proteins consistent with the presence of pork meat, 3 samples (5 per cent) were found also to contain soluble proteins consistent with the presence of lamb meat and 3 samples (5 per cent) were found to contain soluble protein substances consistent with the presence of lamb and pork meats. None of the samples were found to contain soluble proteins consistent with the presence of poultry meat. Thus 10 samples (17 per cent) were found to contain 'foreign' meat.
- 6.6 In 2002, out of 3 samples of lamb mince, two samples were found to contain soluble proteins consistent with the presence of beef, pork and lamb. The 1 sample of turkey mince was found to contain only the correct meat species.

7 Results – Sulphur Dioxide Content

- 7.1 In the 2000 survey a total of 398 samples of standard and lean minced meat were analysed for the presence of sulphur dioxide. Of these 12 samples (3 per cent) contained sulphur dioxide. The values are shown in Table 4.
- 7.2 In the 2001 survey a total of 422 samples of standard and lean minced meat were analysed for the presence of sulphur dioxide. Of these 4 samples (1 per cent) contained sulphur dioxide. The values are shown in Table 4.
- 7.3 In the 2002 survey a total of 396 samples of standard and lean minced meat were analysed for the presence of sulphur dioxide. Of these 9 samples (2 per cent) contained sulphur dioxide. The values are shown in Table 4.
- 7.4 In the 2000 survey a total of 38 samples of minced pork, lamb/mutton and poultry meat were analysed for the presence of sulphur dioxide. Of these 1 sample of lamb mince (2 per cent) contained sulphur dioxide. The positive value is shown in Table 4.
- 7.5 In the 2001 survey a total of 10 samples of minced pork, lamb/mutton and poultry meat were analysed for the presence of sulphur dioxide. None of the samples contained sulphur dioxide.

- 7.6 In the 2002 survey a total of 10 samples of minced pork, lamb/mutton and poultry meat were analysed for the presence of sulphur dioxide. None of the samples contained sulphur dioxide.

8 Statutory Considerations

- 8.1 Until recently there were no statutory standards relating to the fat composition of minced meat.

Requirements for the fat content of minced meat in certain circumstances were introduced by The Minced Meat and Meat Preparations (Hygiene) Regulations, 1995¹¹. These Regulations implement in United Kingdom law the requirements of EC Directive 94/65/EC¹².

- 8.2 The Regulations and Directive are applicable only in certain defined circumstances. They do not apply to minced meat produced on the premises for direct sale to the final customer. Thus the Regulations are not usually applicable to minced meat sold in butcher shops, but may be relevant to minced meat sold in supermarkets, which is frequently produced and packed elsewhere.

However, as a consequence of the way in which the Directive has been interpreted the Regulations restrict its effect even more. Compositional standards only apply where special designations are actually used. The requirements for fat content are given in Table 5.

- 8.3 Even in supermarkets very few sales of minced meat would need to comply with the Regulations since the special designations are very rarely used.

- 8.4 The addition of preservatives to foods in Scotland is controlled by the Miscellaneous Food Additives Regulations 1995.

Prior to 1977, the Regulations in force in Scotland allowed mince to contain up to 450 milligrams per kilogram of sulphur dioxide during the months of June, July, August and September. The current Regulations do not permit the addition of sulphur dioxide to minced meat. However, due to the original dispensation the non-permitted addition of sulphur dioxide to mince has continued to be found to occur occasionally.

- 8.5 There are no specific legal controls on meat species composition of minced meat. The Food Labelling Regulations 1996¹³ require that in the absence of a name prescribed by law for a food, the food may be described either by a customary name or a name which is sufficiently precise to indicate the true nature of the food and to enable the food to be distinguished from other foods with which it could be confused.

¹¹ The Minced Meat and Meat Preparations (Hygiene) Regulations 1995; Statutory Instrument 1995 No 1325, HMSO

¹² EC Directive 94/65/EC; Official Journal No L368, 31.12.94, p10

¹³ Food Labelling Regulations 1996 Statutory Instrument 1996 No 1499, HMSO

The Food Safety Act 1990¹⁴ establishes an offence to describe a food such that the description is likely to mislead a purchaser as to the substance of the food.

9 Discussion – Fat Content

- 9.1 Minced beef sold in Scotland is a traditional and characteristic component of the diet. It is perceived by consumers to be a wholesome and nutritious food with a moderate fat content.
- 9.2 This perception is supported by the results of this and previous Scottish surveys where the fat content has been found to be significantly lower than that reported for the United Kingdom as a whole^{15 16}.
- 9.3 In the reports of the surveys carried out in 1997, 1998 and 1999 it was recommended that minced beef of normal commercial quality should contain not more than 20 per cent fat and that any mince described in any way as having a low fat content should not contain more than 10 per cent fat.
- 9.4 Trends in the average fat content of standard and low fat beef mince are shown graphically in Chart 4.

The results of the current survey show that the average fat content of standard minced beef increased in both 2000 and 2001, but reverted back in 2002 to levels found in previous surveys. In view of the 2002 results, it is unclear whether the results from the 2000 and 2001 surveys represent a temporary change in average fat content, or a reverse in the trend of decreasing fat content observed in previous surveys. In view of the concern that has been expressed regarding the high fat content in the Scottish diet any change to increasing fat content in mince is unwelcome.

The average fat content of lean minced beef found in the present survey is very similar to the values found in previous surveys.

- 9.5 In the 2000 survey 11 samples (4.5 per cent) had fat contents in excess of 20 per cent and of these 5 samples (2 per cent) had fat contents in excess of 25 per cent.

In the 2001 survey 22 samples (11.2 per cent) had fat contents in excess of 20 per cent and of these 7 samples (3.5 per cent) had fat contents in excess of 25 per cent.

In the 2002 survey 19 samples (11.2 per cent) had fat contents in excess of 20 per cent and of these 2 samples (1.2 per cent) had fat contents in excess of 25 per cent (per cent).
- 9.6 Inspection of the frequency distribution charts is interesting. Although most of the samples have fat contents clustering around the average value, in the 2001 and 2002 surveys there is a subsidiary cluster of samples with a fat content of around 20 per cent. Although this was not observed in the 2000 survey, it has been observed in previous surveys.

¹⁴ Food Safety Act 1990, Chapter 16, HMSO

¹⁵ Fat in Minced Beef – A Review by the Association of Public Analysts; Journal of the Association of Public Analysts, 1995, 31 113-120

¹⁶ Fat in Minced Beef; Journal of the Association of Public Analysts, 1996, 32 215-220

- 9.7 It is suspected that some mince sold in supermarket chains is manufactured to a target of about 20 per cent fat and that some “economy” products have an even higher targeted fat content.

Unfortunately, insufficient information has been collected for this survey to permit any differentiation between samples taken from different types of premises. Such premises information should be collected for future surveys.

- 9.8 It has been noted in previous surveys that a significant number of samples of lean mince have high fat contents and this has been noted in the surveys reported here also.

- 9.9 In the 2000 survey 6 samples (46 per cent) had fat contents in excess of 10 per cent of which 1 sample (7.7 per cent) had a fat content in excess of 15 per cent.

In the 2001 survey 9 samples (52.9 per cent) had fat contents in excess of 10 per cent, but no sample had a fat content in excess of 15 per cent.

In the 2002 survey 12 samples (46.1 per cent) had fat contents in excess of 10 per cent of which 4 samples (15.4 per cent) had fat contents in excess of 15 per cent.

- 9.10 In supermarkets, where the facility for controlling fat content is greater, the fat content of lean mince will normally be significantly lower than standard mince from the same outlet.

However, in butcher shops there is likely to be much less control over fat content and as a result descriptions such as “lean” or “low fat” may not be meaningful.

- 9.11 In the reports of the 1997, 1998 and 1999 surveys it was recommended that minced lamb should not contain more than 25 per cent of fat and that minced pork should not contain in excess of 30 per cent fat.

- 9.12 In the 2000, 2001 and 2002 surveys no samples of minced pork contained fat in excess of the limits stated above. However, one sample of minced lamb in the 2002 survey contained more than 25 per cent fat.

- 9.13 There are currently no statutory limits for the fat content of chicken and turkey mince. However, most consumers are aware that poultry has a low fat content and would expect poultry mince to be likewise.

- 9.14 The fat content of dark and light meat of chicken and turkey along with that of skin are presented in Table 6. These values have been taken from a standard reference on the composition of food¹⁷.

In view of the figures in Table 6 the fat content of poultry meat found in the surveys gives rise to concern. Even if the mince was prepared using brown meat alone, then in order to achieve the fat contents observed the prepared mince would have to contain a substantial amount of poultry skin.

- 9.15 Although the consumer would probably accept the presence of some skin in poultry mince they would not expect the high levels that would be required in order to achieve the high levels of fat found in the surveys. It would require the presence of 15 per cent skin in chicken mince in order to produce a fat

¹⁷ McCance and Widdowson’s The Composition of Foods – Fifth Supplement to the Fifth Edition

content of about 10 per cent and the presence of the same amount of skin in turkey mince would result in a fat content of about 5 per cent.

- 9.16 The report of the 1998 and 1999 surveys recommended that minced chicken should contain not more than 10 per cent fat and minced turkey should contain not more than 5 per cent fat.
- 9.17 In the 2000 survey 2 samples of chicken mince (18 per cent) had fat contents in excess of 10 per cent and 6 samples of turkey mince (60 per cent) had fat contents in excess of 5 per cent.
- 9.18 In the 2001 survey 2 samples of turkey mince (50 per cent) had fat contents in excess of 5 per cent. Only one sample of chicken mince was submitted and this had a fat content less than 10 per cent.
- 9.19 In the 2002 survey 4 samples of turkey mince (80 per cent) had fat contents in excess of 5 per cent. Only one sample of chicken mince was submitted and this had a fat content of 14 per cent.
- 9.20 It should be noted that in the 2000, 2001 and 2002 surveys the numbers of "other" minces was small and the conclusions which can be drawn from the results are not statistically significant.

10 Discussion – Meat Species Identification

- 10.1 Although there were a small number of samples of mince of various types containing soluble protein consistent with the presence of a type of meat other than that indicated in the name of the product, such substitution appears to occur only at a low level.

Of some concern, is the number of samples of lamb mince found to contain traces of soluble beef protein. It is likely that a consumer purchasing non-beef mince has done so deliberately either to avoid any risk from BSE or for religious reasons. Having made such a positive choice it is unsatisfactory that the product purchased should be adulterated.

- 10.2 However, the situation may not be as unsatisfactory as it at first appears. The test for the identification of meat species is extremely sensitive and particularly so for traces of blood derived from a “foreign” species. Furthermore, since the test is qualitative it gives no indication of how much adulteration may have occurred.

Therefore, it is possible that the presence of 'foreign' soluble proteins may be due to inadequate cleaning of the mincer between batches of different minces, leaving residues of the previous batch in the mincer. Such a situation is not acceptable.

11 Discussion – Sulphur Dioxide Preservative

- 11.1 The results of surveys carried out since 1988 are summarised in Table 3.
- 11.2 The frequency of adulteration in the 2000 survey was similar to that found in previous surveys, although the very high amounts of sulphur dioxide found in

some samples in previous surveys (>1000 mg/kg) were not found in the 2000 survey.

- 11.3 The frequency of adulteration in the 2001 survey was less than that found in previous surveys, including 2000. However, the 2001 survey produced one sample with a high level of sulphur dioxide.
- 11.4 The frequency of adulteration in the 2002 survey was similar to that found in previous surveys. The very high amounts of sulphur dioxide found in some samples in earlier surveys were not found in the 2002 survey.
- 11.5 The 2001 survey demonstrated a reduction in the frequency of adulteration with sulphur dioxide. However, the 2000 and 2002 surveys showed similar frequencies of adulteration and in line with earlier surveys. Therefore, it is apparent that the illegal addition of sulphur dioxide to minced meat is a continuing practice.
- 11.6 It is considered highly unlikely that the addition of sulphur dioxide is due to lack of knowledge within the meat trade. It must be concluded that by adopting this practice, a small number of meat traders are prepared to flout the law and risk prosecution.
- 11.7 Addition of sulphur dioxide to food will result in ingestion by consumers of a variety of sulphite compounds. Sulphur dioxide gas may be liberated on cooking resulting in exposure by inhalation.

Ingestion of sulphites can produce irritation of the stomach and intestines, leading to vomiting, diarrhoea, skin flushing and irritation. Inhalation of sulphur dioxide can result in respiratory problems due to bronchial irritation. In some persons an allergic reaction may result in more severe symptoms of breathlessness and wheezing.

Owing to the permitted usage of sulphur dioxide in a wide variety of foods, it has been estimated that the Average Daily Intake (ADI) for sulphur dioxide may be exceeded by some individuals¹⁸. It was in recognition of these circumstances and the significance of mince in the Scottish diet that the Food Additives and Contaminants Committee recommended that the provision to permit the addition of sulphur dioxide to minced meat sold in Scotland should be withdrawn.

12 Conclusions

- 12.1 The average fat content of standard beef mince showed a significant increase in the 2000 and 2001 surveys, but in 2002 reverted back to the lower level found in previous surveys. The significance of these results is unclear and requires monitoring in future years.
- 12.2 The average fat content of lean mince has not changed in relation to previous surveys.
- 12.3 In general the amount of fat in pork and lamb mince is at a low level and in line with the amounts recommended in previous reports.

¹⁸ Review of the Preservatives in Food Regulations 1962, FACC/REP/14/1972, HMSO”

- 12.4 The amount of fat found in chicken and turkey mince is high compared with the fat content of raw chicken and turkey meat. The results indicate the inclusion of significant amounts of poultry skin in the mince. A number of the samples contained fat in amounts greater than the maximum values recommended in a previous report.
- 12.5 The incidences of the presence of meat species other than that indicated or implied in the name of the product continues to be observed but only at a low level.
- 12.6 The illegal addition of sulphur dioxide to minced meat continues to occur, but only in a small number of samples.

13 Recommendations

- 13.1 In view of consumer expectations, previous findings and practice within the Scottish meat trade it is the recommendation of the Scottish Food Enforcement Liaison Committee that:
 - a) minced beef of normal commercial quality sold in Scotland should contain not more than 20 per cent fat;
 - b) minced beef of normal commercial quality sold in Scotland and described as being 'lean' or 'low fat' should contain not more than 10 per cent fat;
 - c) 'economy' minces which have been produced from particularly fatty cuts of meat and hence have a fat content in excess of 20 per cent should have a clearly visible declaration of the actual fat content either on the packaging or on a notice at the point of sale.
- 13.2 The Committee recommends that the following limits should continue to be applied:
 - a) minced pork should not contain more than 30 per cent fat;
 - b) minced lamb should not contain more than 25 per cent fat;
 - c) minced chicken should not contain more than 10 per cent fat;
 - d) minced turkey should not contain more than 5 per cent fat.
- 13.3 It is further recommended that The Minced Meat and Meat Preparations (Hygiene) Regulations 1995 should be reviewed so that the compositional requirements for fat content are applicable to all minced beef, pork and sheep meat, irrespective of where it has been produced and how it is designated.
- 13.4 It is recommended that discussions should take place between the Food Standards Agency Scotland and representatives of the meat trade to highlight the continuing problem of the illegal addition of sulphur dioxide to minced meat and identify ways of eliminating the practice.

Environmental Health Departments must continue to pursue traders who illegally add sulphur dioxide to minced meat. When cases are reported to the Procurator Fiscal, sampling officers should ensure that information is presented which emphasises the fraudulent nature and potential health effects of this practice to the Fiscal and, subsequently, the Sheriff.

- 13.5 It is recommended that SFELC's Food Standards Sub-committee continues to report on fat, species and sulphur dioxide analysis of samples of minced meat carried out as part of local authority sampling programmes."

Tables

Table Number	Title
1a	Summary of Results of Previous Surveys of the Fat Content of Standard Mince
1b	Summary of Results of Previous Surveys of the Fat Content of Lean Mince
1c	Summary of Results of Previous Surveys of the Fat Content of "Other" Mince
2a	Survey of the Fat Content of Minced Meat 2000 - Summary of Results
2b	Survey of the Fat Content of Minced Meat 2001 - Summary of Results
2c	Survey of the Fat Content of Minced Meat 2002 - Summary of Results
3	Summary of Results of Previous Surveys of Sulphur Dioxide in Minced Meat
4	Summary of Results of Sulphur Dioxide Content in Minced Meat 2000-2002
5	The Minced Meat and Meat Preparations (Hygiene) Regulations 1995 - Compositional Requirements for Minced Meat
6	Fat Content of Poultry Meat

Table 1a
Summary of Results of Previous Surveys of
the Fat Content of Standard Mince

Survey Period	Number of Samples	Average Fat Content (per cent)	Proportion of Samples with Fat >20 per cent	Proportion of Samples with Fat >25 per cent
1988	783	12.7	11.8 per cent	4.7 per cent
1993	376	11.2	6.4 per cent	0.3 per cent
1995	609	12.3	11.1 per cent	2.3 per cent
1996	410	13.3	15.1 per cent	5.1 per cent
1997	463	11.4	6.0 per cent	1.5 per cent
1998	295	10.3	8.0 per cent	2.0 per cent
1999	375	11.1	11.7 per cent	5.3 per cent

Table 1b
Summary of Results of Previous Surveys of
the Fat Content of Lean Mince

Survey Period	Number of Samples	Average Fat Content (per cent)	Proportion of Samples with Fat >20 per cent	Proportion of Samples with Fat >25 per cent
1995	76	10.8	Nil	Nil
1996	82	8.7	Nil	Nil
1997	33	9.9	6.0 per cent	3.0 per cent
1998	31	9.7	19.7 per cent	Nil
1999	26	9.0	Nil	Nil

Table 1c
Summary of Results of Previous Surveys of
the Fat Content of “Other” Mince

Survey Period	Number of Samples	Average Fat Content (per cent)	Proportion of Samples with Fat >20 per cent	Proportion of Samples with Fat >25 per cent
1995	8	13.5	12.5 per cent	12.5 per cent
1996	66	16.1	60.1 per cent	24.2 per cent
1997	41	13.4	21.9 per cent	9.8 per cent
1998	42	-	11.9 per cent	Nil
1999	98	-	19.4 per cent	3.9 per cent

Table 2a
Survey of the Fat Content (Per Cent) of Minced Meat
2000
Summary of Results

2000 Results	Standard Mince	Lean Mince	Pork Mince	Lamb Mince	Turkey Mince	Chicken Mince	Venison Mince
Number of Samples	240	13	3	13	10	11	1
Average Fat Content	14	10.6	9.8	12.1	5.5	8.5	3.2
Minimum Fat Content	2.3	7.1	3.4	6.3	4.3	5.3	
Maximum Fat Content	31.4	18.0	14.9	23.9	6.1	11.0	

Table 2b
Survey of the Fat Content (Per Cent) of Minced Meat
2001
Summary of Results

2001 Results	Standard Mince	Lean Mince	Pork Mince	Lamb Mince	Turkey Mince	Chicken Mince
Number of Samples	196	17	1	4	4	1
Average Fat Content	17	9.3	7.5	17.5	5.7	4.7
Minimum Fat Content	2.6	4.1		10.8	5.0	
Maximum Fat Content	44.1	14.0		22.3	6.8	

Table 2c
Survey of the Fat Content (Per Cent) of Minced Meat
2002
Summary of Results

2002 Results	Standard Mince	Lean Mince	Pork Mince	Lamb Mince	Turkey Mince	Chicken Mince
Number of Samples	169	26	2	6	5	1
Average Fat Content	10.1	10.7	13.8	19.9	7.3	14
Minimum Fat Content	0.6	5.8	12.3	10.6	4.0	
Maximum Fat Content	25.9	18.5	15.2	29.9	13.5	

Table 3
Results of Previous Surveys of Sulphur Dioxide in Minced Meat

	1988-89	1991-92	1997	1998	1999
Number of Samples	1326	-	544	594	809
Number with Preservative	48 (3.6%)	26	13 (2.4%)	23 (3.8%)	20 (2.4%)
Range of Sulphur Dioxide (mg/kg)	20-2900	30-4100	51-1450	50-5000	19-2252

Table 4
Summary of Results of Sulphur Dioxide content in Minced Meat

2000 Sulphur Dioxide (mg/kg)	2000 Sulphur Dioxide Other Meats (mg/kg)	2001 Sulphur Dioxide (mg/kg)	2002 Sulphur Dioxide (mg/kg)
1 19	1 196	1 155	1 61
2 26		2 156	2 94
3 140		3 245	3 139
4 151		4 1050	4 142
5 197			5 307
6 221			6 320
7 286			7 338
8 352			8 472
9 414			9 876
10 594			
11 621			
12 623			

Table 5
The Minced Meat and Meat Preparations (Hygiene)
Regulations 1995
Compositional Requirements for Minced Meat

Designation	Fat Content (per cent)
"Lean minced", used in relation to meat of any permitted species	≤ 7
"Minced pure", used in relation to meat of bovine animals	≤ 20
"Minced", used in relation to meat of any permitted species and containing pig meat	≤ 30
"Minced", used in relation to sheepmeat or goat meat	≤ 25

Table 6
Fat Content of Poultry Meat

Meat	Fat Content (per cent)
Chicken – white meat	2.8
Chicken – brown meat	1.1
Chicken – skin	48.3
Turkey – white meat	2.5
Turkey – brown meat	0.8
Turkey – skin	30.7

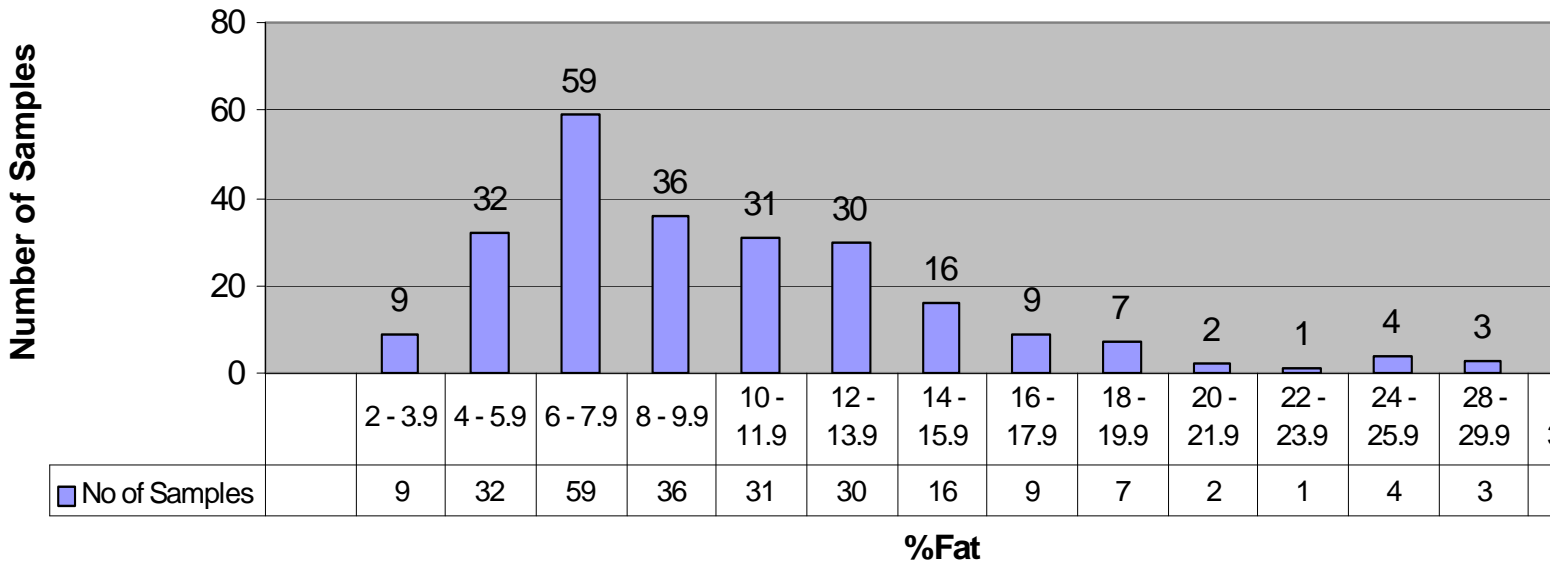
Charts

Chart Number

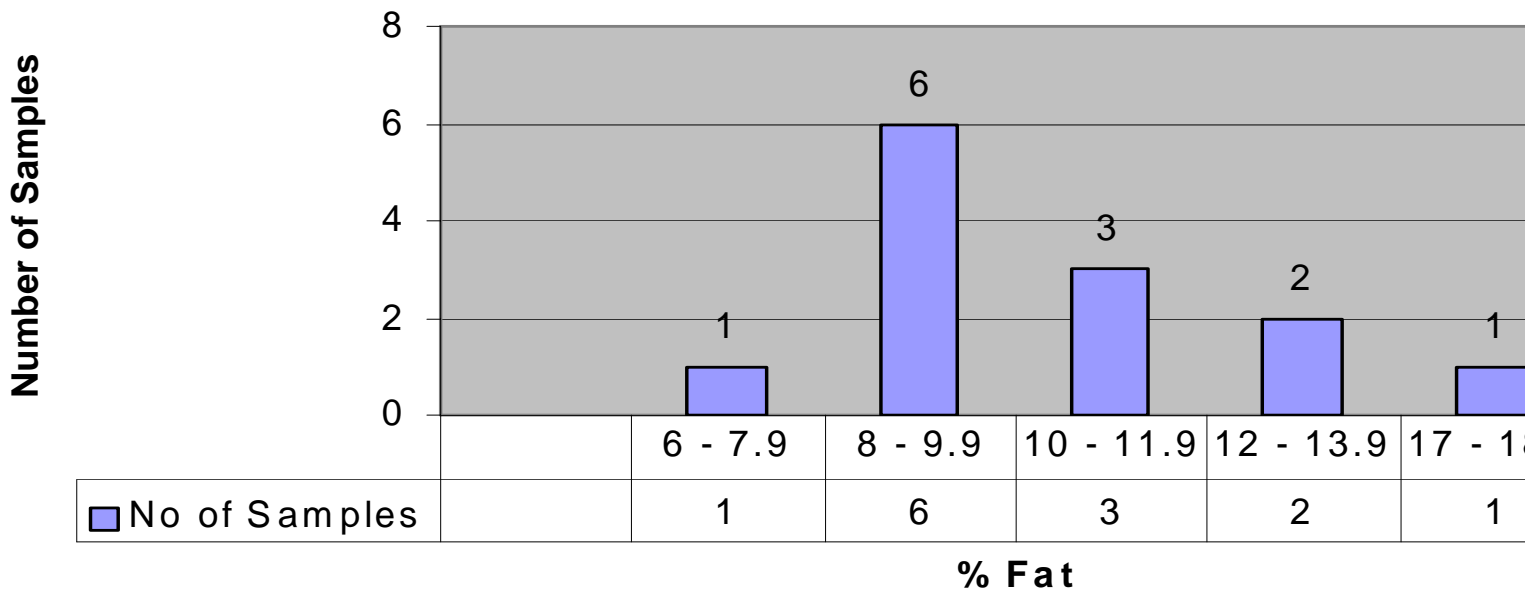
Title

- 1a** Frequency Distribution – Beef Mince 2000
- 1b** Frequency Distribution – Lean Beef Mince 2000
- 1c** Frequency Distribution – Pork Mince 2000
- 1d** Frequency Distribution – Lamb Mince 2000
- 1e** Frequency Distribution – Poultry Mince 2000
- 2a** Frequency Distribution – Standard Beef Mince 2001
- 2b** Frequency Distribution – Lean Beef Mince 2001
- 2c** Frequency Distribution – Lamb Mince 2001
- 2d** Frequency Distribution – Poultry Mince 2001
- 3a** Frequency Distribution – Standard Beef Mince 2002
- 3b** Frequency Distribution – Lean Beef Mince 2002
- 3c** Frequency Distribution – Lamb Mince 2002
- 3d** Frequency Distribution – Poultry Mince 2002
- 3e** Frequency Distribution – Pork Mince 2002
- 4** Trend in Fat Content – Standard and Lean Beef Mince

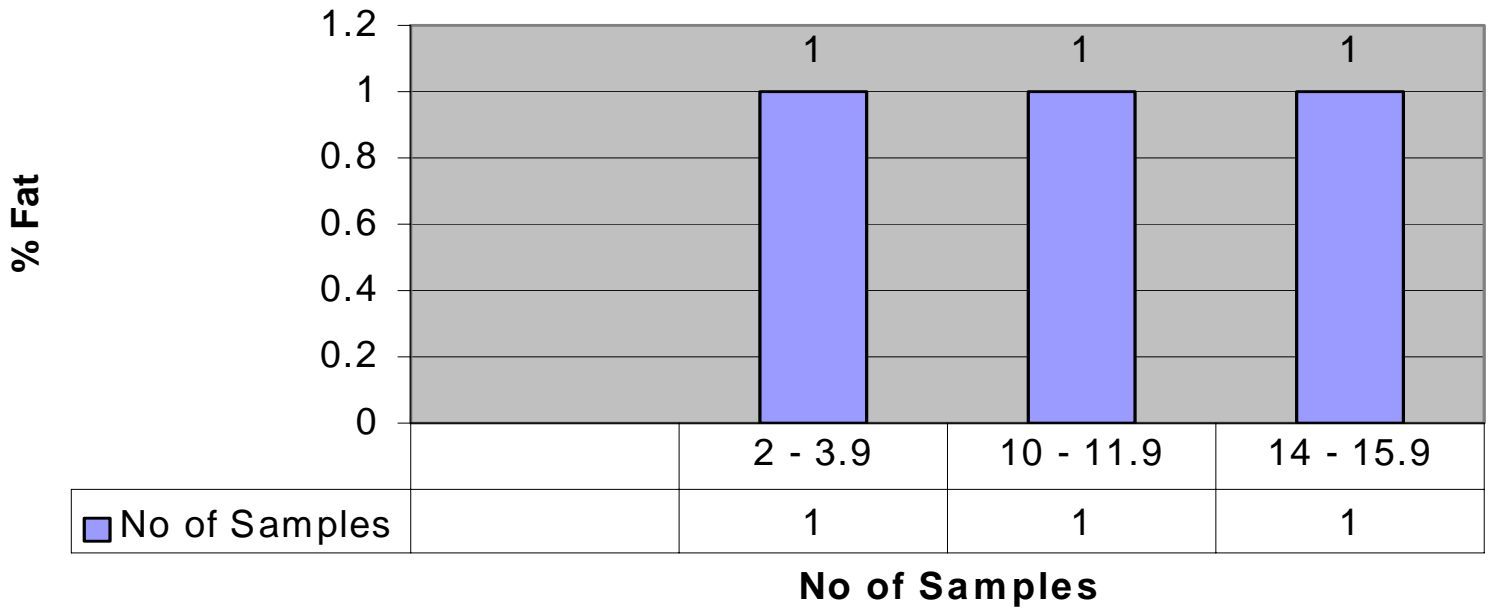
1a - Mince 2000



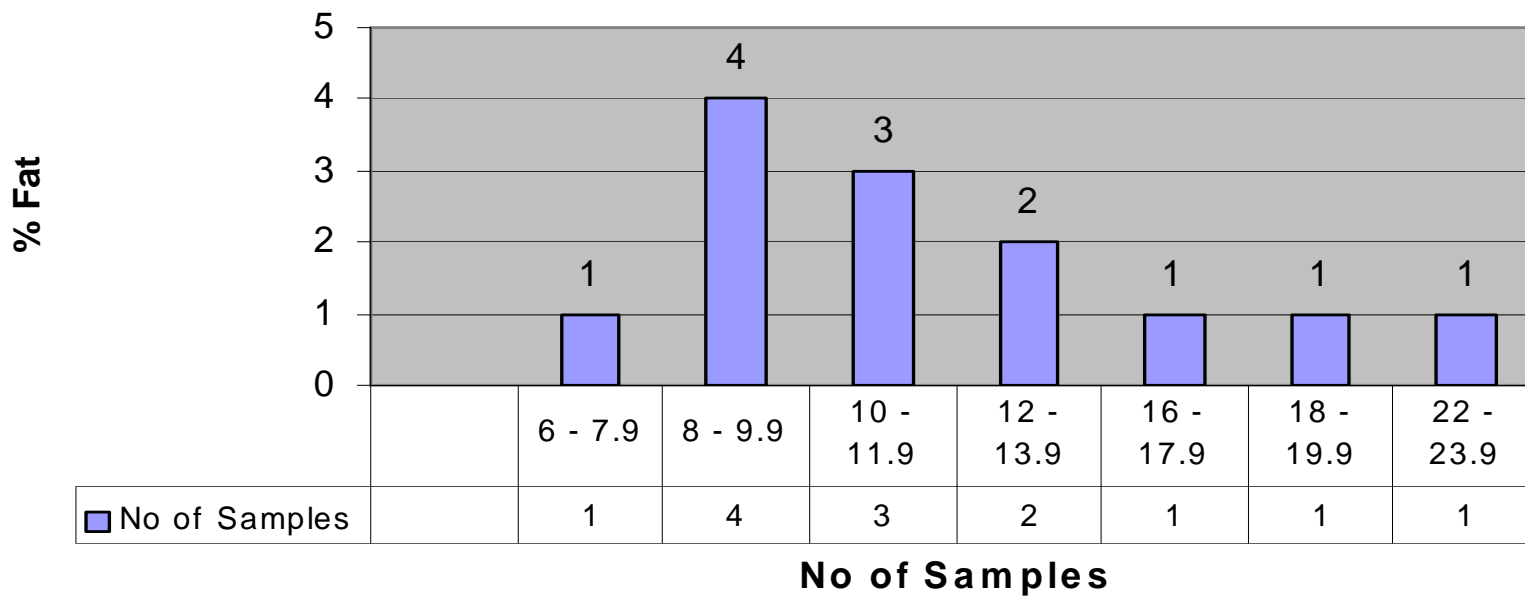
1b - Lean Mince 2000



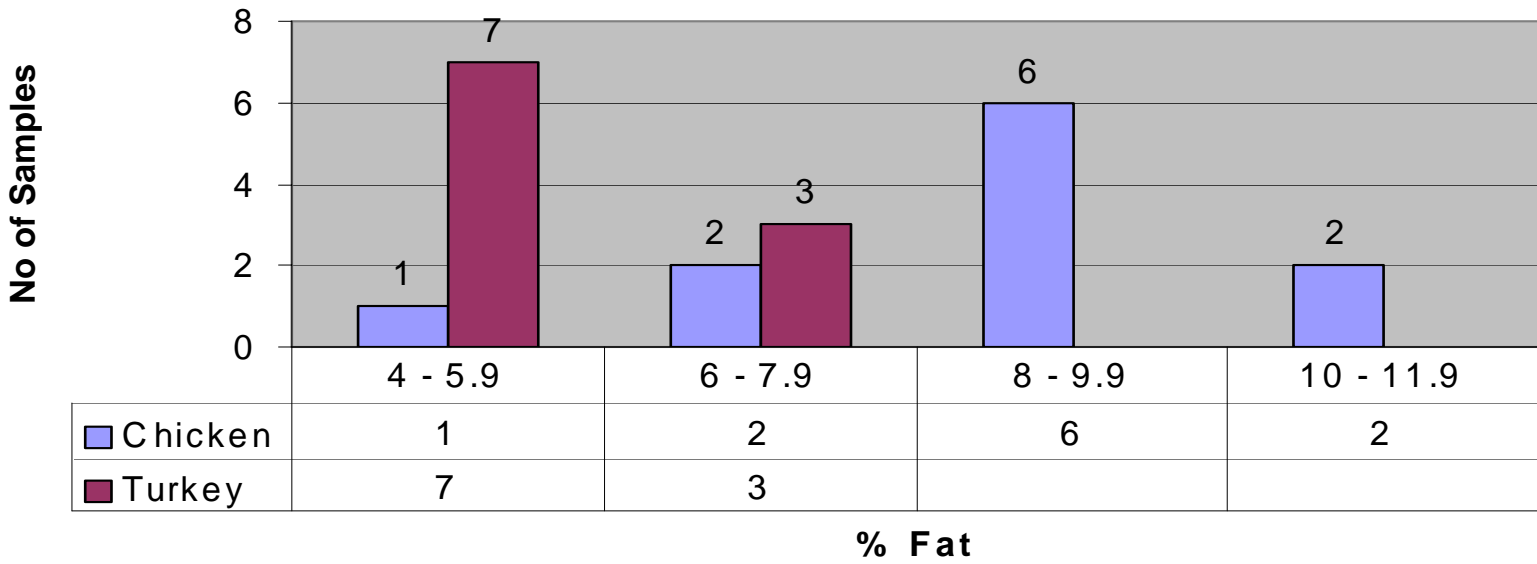
1c - Pork Mince 2000



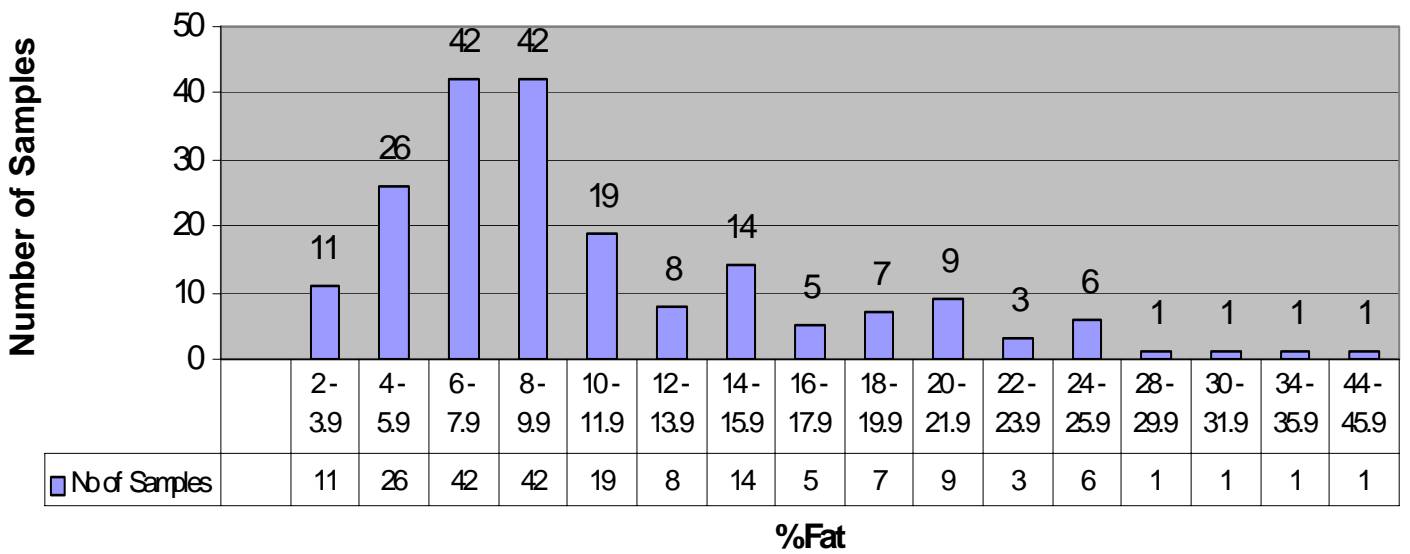
1d - Lamb Mince 2000



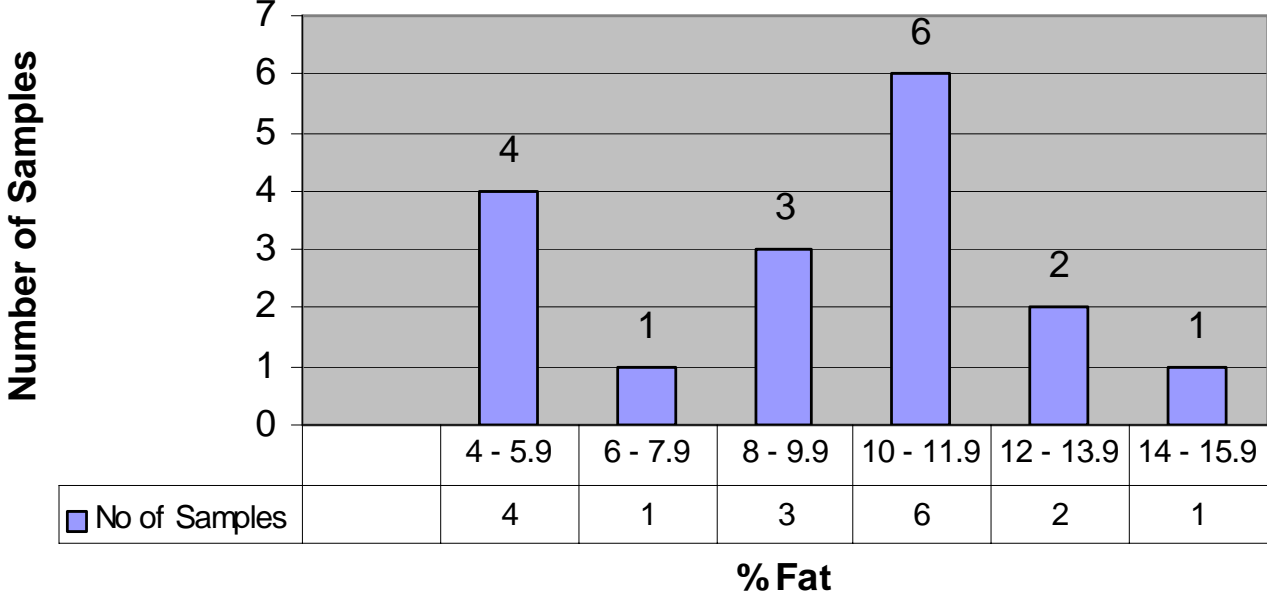
1e - Poultry Mince 2000



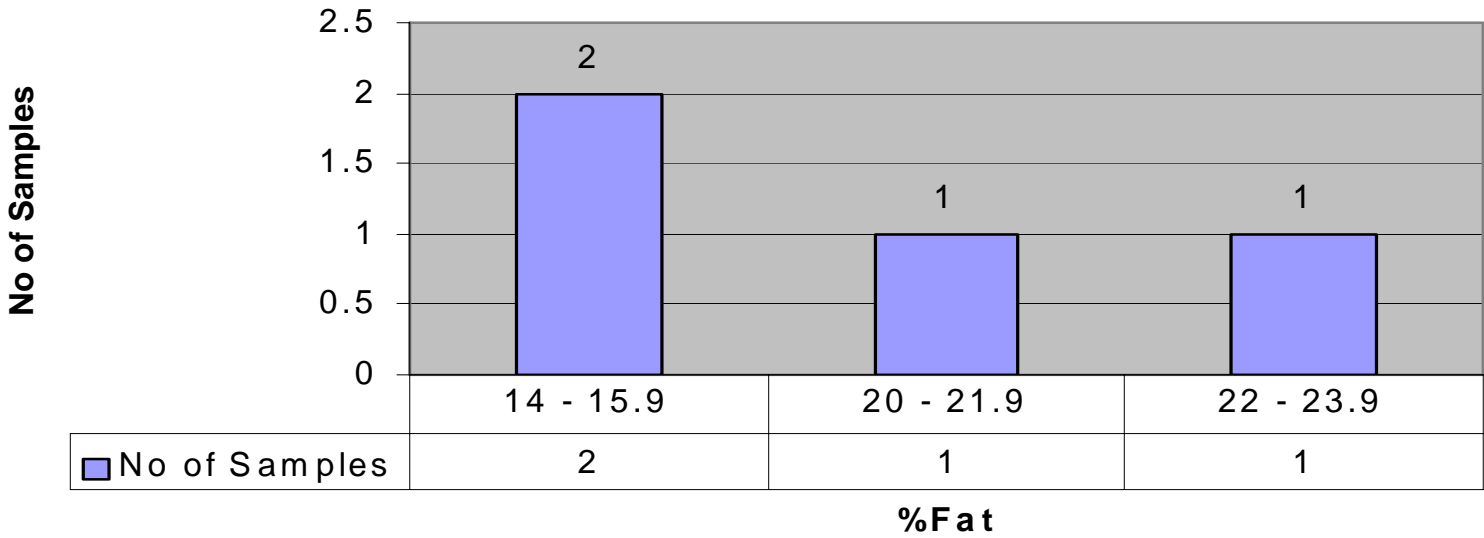
2a - Mince 2001



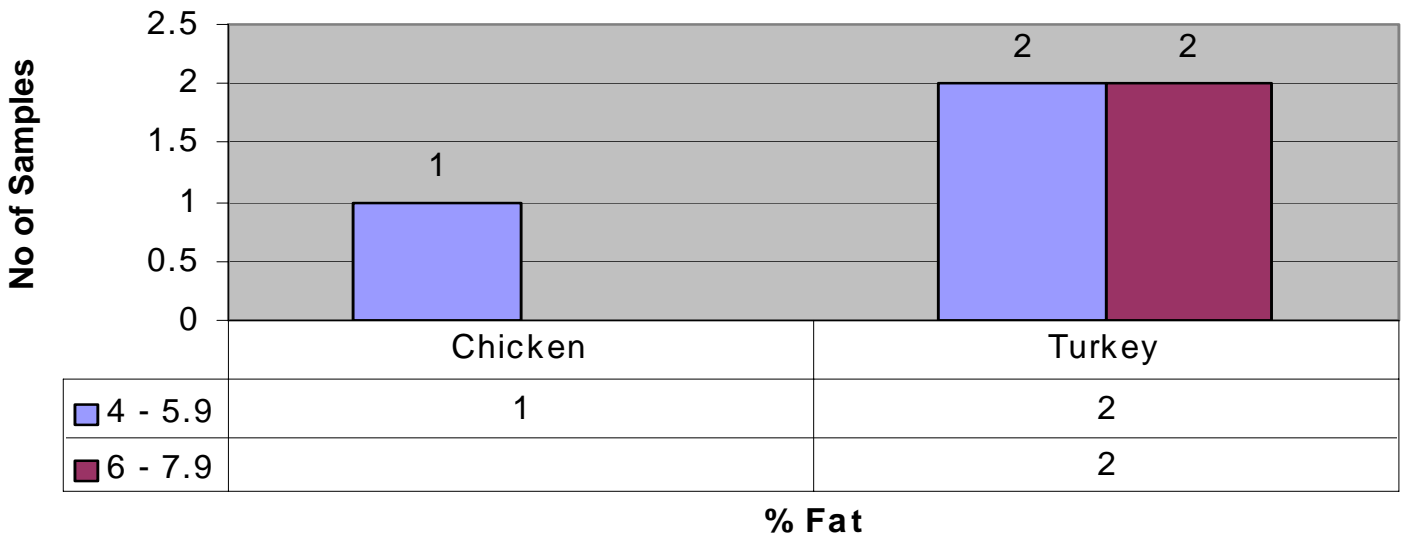
2b - Lean Mince 2001



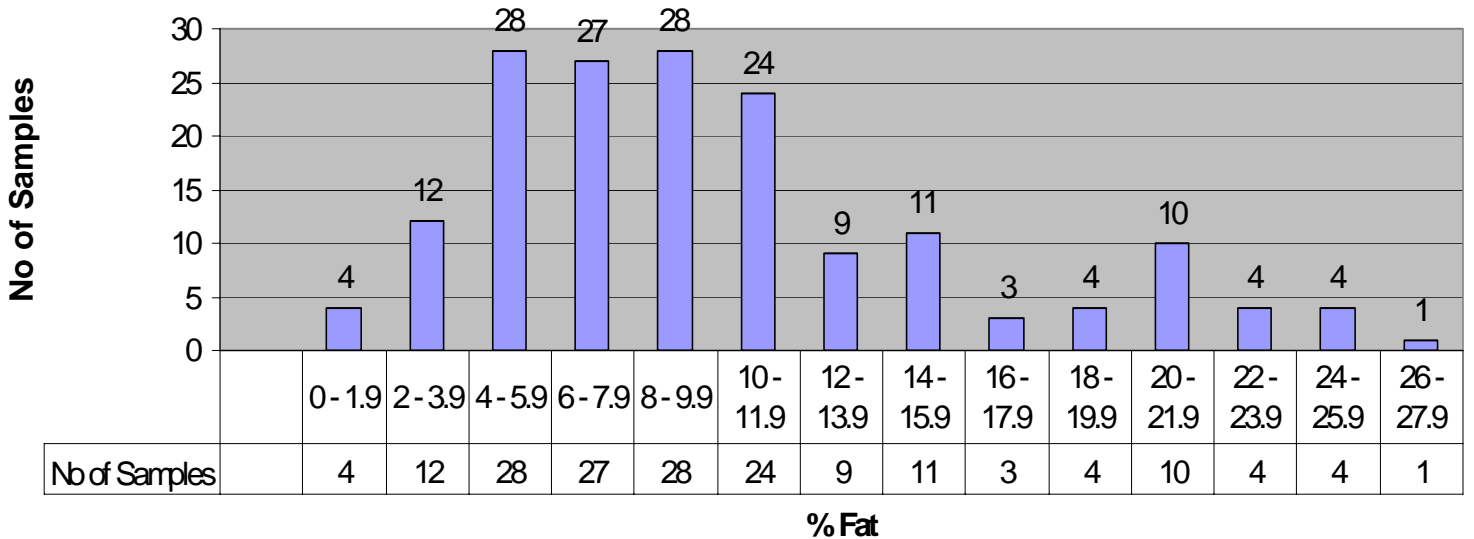
2c - Lamb Mince 2001



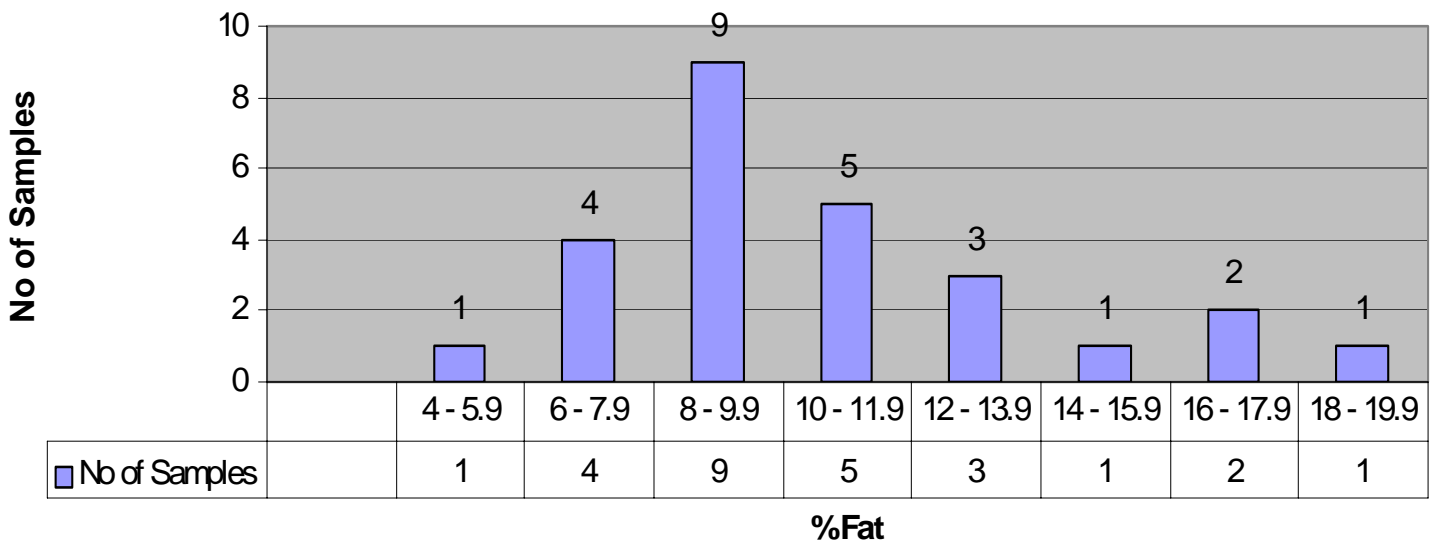
2d - Poultry Mince 2001



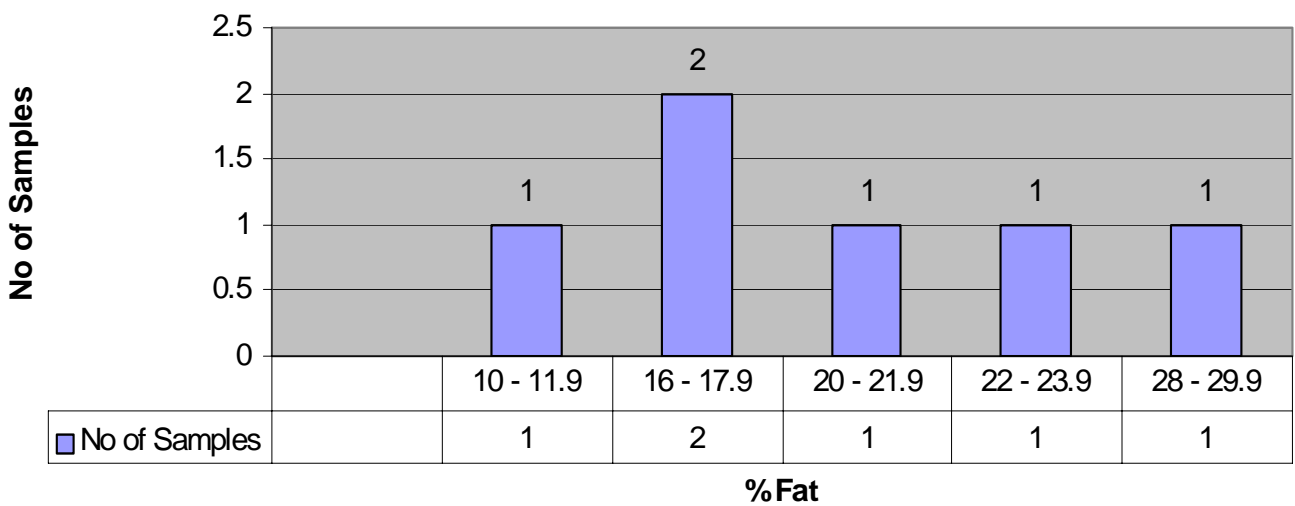
3a - Standard Beef Mince 2002



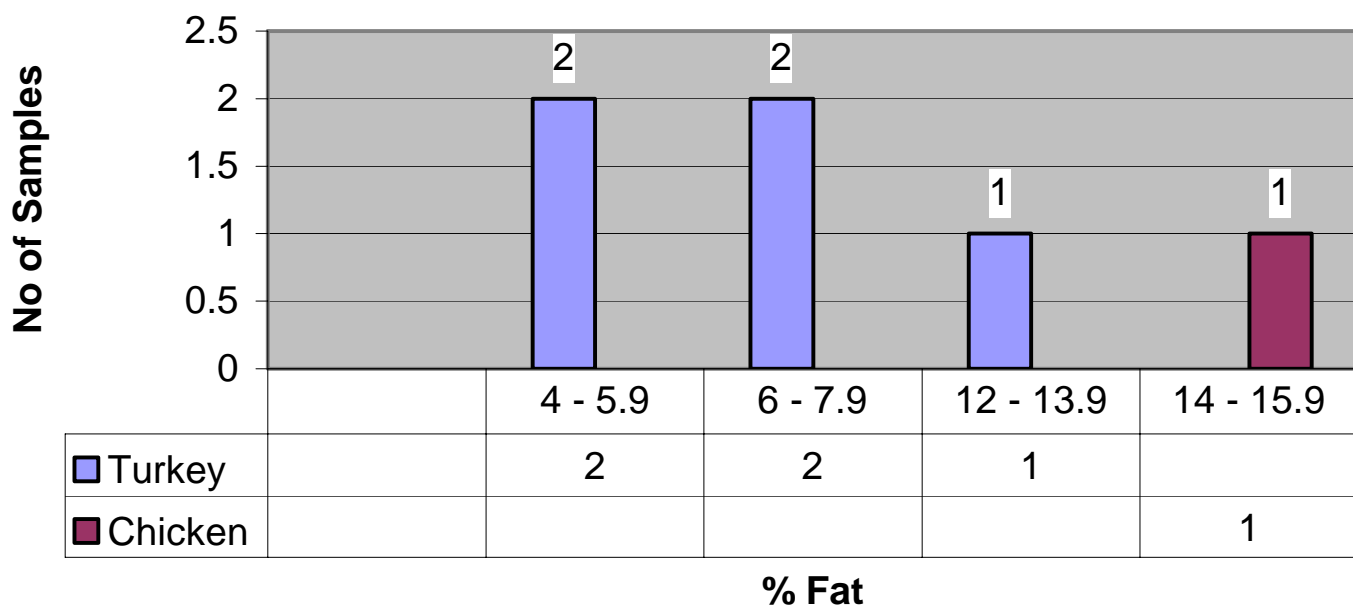
3b Lean Beef Mince 2002



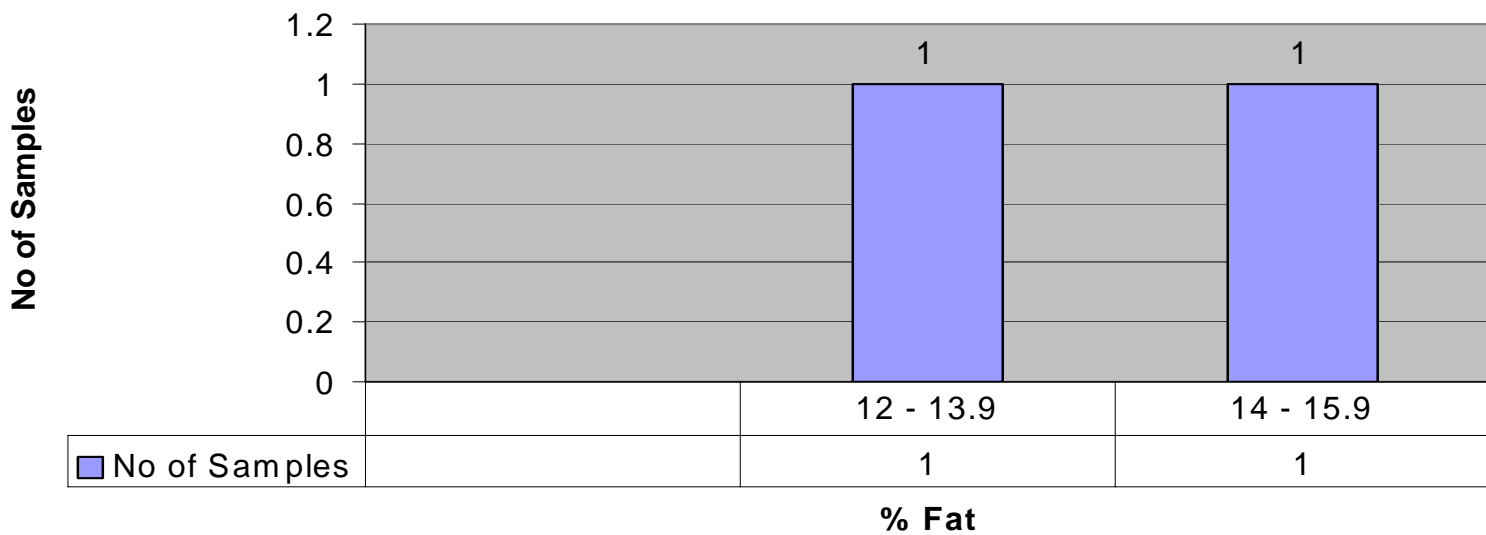
3c Lamb Mince 2002



3d Poultry Mince 2002



3e Pork Mince 2002



4 - Trend in Fat Content

