Since the objective of the chemical methods committee was to see what the situation is in respect to the suitability of available methods and to find the gaps where new methods are necessary in order to continue advancement in research, questionnaires were mailed out to various institutions and research workers. The response to the questionnaires was very gratifying with a total of 41 being returned. Thirty-two questionnaires were received from research workers engaged in college or experiment station work with the representation being well distributed between Chemistry, Home Economics and Animal Husbandry departments. Six questionnaires were returned by meat packers conducting active research programs, while the remaining three questionnaires came from The Canadian National Research Council, the American Meat Institute Foundation, and the Bureau of Animal Industry of the U.S.D.A.

In reporting the methods used, the more common methods will be simply reported by reference, number of researchers using the method, and the general suitability according to those replying. New methods and modifications of old methods will receive special attention with either a reference or brief description and the name of the institution reporting the method. A list of those mailing in questionnaires from the various institutions will be given in order to facilitate exchange of ideas on methods and variations.

**Muscle - Routine Analysis**

**Total N**

The responses indicate that the Kjeldahl-Gunning-Arnold method (AOAC) was most commonly used with 26 researchers indicating they utilized this method of determining total nitrogen and all apparently being satisfied with the method. In addition, one researcher (Chicago U.) modified the Kjeldahl method with the use of boric acid and indicated the method was satisfactory. The Micro-Kjeldahl method (AOAC. VI-41.3) with modifications was used by five institutions. The Micro-method was modified by steam distillation (New York) and the use of a selenium catalyst (Iowa), while all indicated they felt the method to be satisfactory. One institution (Florida) indicated that they used the Cole-Parkes semimicro-Kjeldahl method (J. Indus. Engin. Chem. Anal. Ed. 18:263) but were not certain as to the reliability for meats.

**NPN**

Only seven questionnaires indicated NPN was determined and only two (Montana and Massachusetts) used the same method (AOAC). One (AMIF) used nitrogen soluble in 4% trichloroacetic acid (Gunning) method and another used 10% trichloroacetic acid filtrate (Kansas). The BAI workers used tungstic acid and trichloroacetic acid as protein precipitants (J.B.C. 111: 253; J. Hemot. 6:459; J.B.C. 60:257) and collected the filtrate on which they ran Micro-Kjeldahls (J. Ind. Eng. Chem. Anal. Ed. 14:280) except for the use of the AOAC catalyst. The Miller-Van Slyke Method (J.B.C. 55:253) was used by Ohio, while another (Oscar Mayer) used the method of Almquist (J. Nutr. 10:193). All indicated their method to be satisfactory.
Fat

Sixteen questionnaires indicated the use of the AOAC method for determination of fat with all being fairly well satisfied though one indicated some improvement was needed. Five used Soxhlet extraction with one being doubtful (Oscar Mayer) as to the results. The modified Babcock procedure of determining fat by dissolving in acetic acid and sulfuric acid and then following the milk-fat procedure was used by three laboratories (Iowa, Kansas and New York). One indicated they were not certain of the results, while the other two felt the results were reliable. Wisconsin used the Goldfish ether extraction method, while Wilson used skellysolve on the residue from moisture determinations in the Brabender oven and determined the fat by loss in weight of the dried residue. Acid hydrolysis was used by U. of Chicago but the results were uncertain for fat determination. Ohio workers used the method of Schmid (Anal. Chem. 27:464). Antipyrine was used as a method of determining fat by Maryland workers.

Moisture

Great variation was found to occur in methods used for moisture determination, particularly in regard to time and temperatures. Sixteen researchers indicated they followed the AOAC method and all but one were satisfied with results. The short periods were 5 hours at 100° C. (AMIF) and 6 hours at 104° C. (Ohio) both in air. One researcher (California) indicated vacuum drying but did not specify time or temperature. Colorado reported the use of a modified fractional fat-moisture extraction but were uncertain as to the reliability. Asbestos was used in drying the sample (Syracuse University) at 100° C. The Brabender oven balance was used for 16-18 hours at 103-107° C. or 75 - 90 minutes at 139 - 141° C. (Michigan, Wilson). Kentucky workers reported using the method of Peterson (Lab. Manual of Food Chem., Wm. C. Brown & Co.). The longer period in drying used 95° C. in a vacuum oven for 48 hours (Texas), 60° C. in vacuum oven for 24 - 48 hours (Illinois) and 200° F. for 48 hours (Wisconsin).

Ash

A total of 18 laboratories indicated that they were running routine ash analyses, with all but two using the AOAC method and indicating satisfactory results. Of the other two researchers one institution (Kansas) used a temperature of 500° C. for 16 hours, while another (North Carolina) reported a temperature of 400° C. overnight and then 2 hours at 600° C. All procedures were apparently giving satisfactory results.

Muscle - Specialized

ATP and ADP

Only two researchers stated that they were determining ATP or ADP, of these one (AMIF) used the manometric technique of Umbriet, Burris and Stauffer. The other questionnaire indicating analysis for ATP and ADP did not give the method but stated specialized methods were used (Montana).

Press Fluid

Six institutions stated they made press fluid determinations. The response to this question indicated considerable uncertainty as to the reliability of the methods used. Two (New Jersey, Kansas) stated they used the
Carver press but only one was satisfied with results and neither indicated the detailed procedure used in making determinations. Another (BAI) used the Carver press according to the method given in J. Agr. Res. 66:403, and expressed confidence in the method, while the other using the method of Causey et al. (Food Res. 15:237) was uncertain as to results. The other two (Montana and Massachusetts) indicated determinations were made but did not list methods.

Collagen

Nine researchers indicated that they make use of collagen determinations. The most commonly used method was that of Hartley and Hall (Food Res. 14:195) with three investigators (Kansas, New York, Florida) stating they used this method. Two of those using the method were satisfied while one was uncertain as to the reliability of the measure. A new method offering considerable promise is the method of Wang (AMIF). The method of Bell, Dorman and Morgan (Food Res. 6:245) was used by California investigators, while Texas workers used the method of Cover and Hamalainen (Tex. Agr. Exp. Sta. Bul. 661) and Chicago U. researchers used the method of Lowry, Gilligan and Katersly.

Glycogen

Six questionnaires showed glycogen determinations were being made. Glycogen was determined by Oesting and Beach's modified Shaffer-Hartman-Somogyi method (Utah), by the method of Hagedorn-Jensen, Freedman, Cotonio and Shaffer (Cornell Med. College) and by the modified method of Seifert et al. (Arch. Biochem. 25:191) which is now in press (Canadian National Res. Council). Other methods used include the method of Good et al. (J.B.C. 1933:490) used by AMIF and the method given in Kansas Agr. Exp. Sta. Tech. Bul. 58 (p.67) used by Kansas workers.

Lactic Acid

Only five institutions indicated they were determining lactic acid. Although everyone seemed satisfied with the methods available, each used a different method. North Carolina used the method of Friedeman and Kendall (J.B.C. 56:23); AMIF used a manometric technique; Canadian National Research Council used the method of Barker and Sumnerior (J.B.C. 138:535); Kansas used the method published in Kan. Tech. Bul. 58 (p.67), while Montana did not specify the method used.

pH

The measurement of pH was made by 18 institutions with the 12 using the glass electrode but not elaborating on the preparation of the sample, while one other (AMIF) specifies they use the glass electrode on a H2O and tissue slurry. One (Canadian Nat. Res. Council) uses the method of Callow as found in the Rpt. F.I.B. for 1937 (p. 49-51). BAI workers indicated that they use the method reported in Food Tech. (June 1951). One (North Carolina) reported they use an electrometric technique, while another (Montana) states determinations are made but do not give any clue as to the method. One (Georgia) states that they "press the electrodes into the meat". Another (Swifts) indicate they make use of a modified hydrogen ion concentration method of measuring pH. All investigators considered their method to be satisfactory.
Amino N

A total of nine institutions indicated that they determine amino N, with five indicating they use the formol titration method and find it to be satisfactory. Two (AMIF, Ohio) use the Van Slyke method, with a "definite time and shaking speed" being used by one (AMIF). Another (MIT) used the method of Pope and Stevens, while the other one (Montana) failed to specify the method.

Soluble N

Only four institutions indicated that they determine soluble N. Kansas workers use the collagen centrifugate, and Ohio uses the AOAC Kjeldahl method. BAI workers use the method found in J. Fish Res. Ed. Can. 7:585; while Montana fails to specify their method. All were satisfied with the methods.

SH groups

According to the questionnaires, only one of the institutions (Missouri) measured SH groups (J. Dairy Sci. 33:890) which indicates that either a good method is needed or the determination is of no value. Since SH groups can be used as measures of certain breakdowns occurring in food, the need of a good method appears to be more likely.

Minerals

A total of 16 institutions stated they determine one or more minerals.

Phosphorus

A total of 11 institutions stated that they determine phosphorus, with four using the AOAC method and three using the Fiske-Subbarow method (J.B.C. 66: 325). Kansas workers use the method in Kan. Tech. Bul. 58 (p.11), while North Carolina uses the method published in Ind. Eng. Chem. Anal. Ed. 14:155. Utah uses a modification of the method of Sandell and Park, and Montana uses a modification of a "colorimetric method". All researchers were satisfied with the methods used.

Calcium

A total of 10 questionnaires indicated that calcium determinations were being used in meats research. Six researchers stated that they use the AOAC method for determination of calcium. One (Cornell Med. College) used the McCrudden method; another (Kansas) used the method found in Kan. Tech. Bul. 58 (p.11); while another (Utah) used the method of Sandell and Park but felt it needed improvement, and the other institution (Montana) stated only that a modification of a colorimetric method was used.

Magnesium

Only three researchers indicated that they analyze for magnesium. Cornell Med. College uses the method of McCrudden, Utah uses the method of Sandell and Park but indicates the method needs improvement, and Montana states colorimetric methods are used.
Iron

Four questionnaires show iron analysis is conducted in meats studies. Armour uses the AOAC method and finds it to be satisfactory. Swift uses a colorimetric determination of iron which is also used by Montana, while Utah uses a modification of Sandell and Park but feel the method could be improved.

Copper

Two researchers analyze for copper, with one (Swift) using the spectrophotometric method and the other (Montana) a colorimetric method.

Potassium

Three questionnaires show that potassium determinations are being made on meats. Cornell Med. College uses flame photometry, Utah uses the method of Sandell and Park with modification, while Montana uses a modification of a colorimetric method.

Chlorides

A total of nine replies showed that chlorides are being determined in meats work. Three use the AOAC method and 3 use the Volhard method (AOAC J. 11:543). Maryland uses the method of Clarke (Anal. Chem. 22:553). The other two (Missouri, North Carolina) use the potentiometric method of Brady et al. (Food Res. 14:303). All indicated the methods to be satisfactory.

Vitamin A.

Seven institutions indicated that they determined vitamin A in meats. Four used the method of the Assoc. Vit. Chemists. One (Wisconsin) uses the method of Gyorgy, another (MIT) uses the ultraviolet spectra method of the U.S.P. and the other (Florida) uses the method published in Biochem. J. 20:497. All marked the methods as adequate.

Carotene

Seven institutions indicated they analyzed for carotene, with three using the Carr-Price procedure (Assoc. Vit. Chem.), two using the official AOAC method, one (Wisconsin) using the method given by Gyorgy, and the other one using the method given in Ind. Engin. Chem. Anal. Ed. 9:71. All respondents felt the method used to be satisfactory.

Tocopherols

Only one questionnaire (California) indicated that tocopherols were being determined and the adequacy of the method was not known.

Vitamin D

Two researchers (California, Massachusetts) determine vitamin D, with the former institution using the bioassy method and the other using the official AOAC method.
Thiamine

A total of 17 institutions stated they run thiamine analyses. Twelve use the thiochrome method or some modification of this method (Ind. Eng. Chem. 15:380). Two (Wisconsin, AMIF) use the procedure given in "Methods of Vitamin Assay." BAI workers use the extraction method outlined in Can. J. Res. 25T. March, 1947 and assay by the AOAC procedure. The Canad. Nat. Res. Council uses the method of Reedman and Young, while Florida workers use the microbiological method of Hammer et al. (Food Res. 8:444).

Riboflavin

Seventeen different researchers indicated that they determined riboflavin in meat and meat products, of which thirteen used the fluorimetric procedure in some form. An additional four (MIT, Florida, Can. Nat. Res. Council, Swift) use microbiological methods with the method of Snell and Strong (Ind. Eng. Chem. Anal. Ed. 11:346) being the most commonly used microbiological method. Apparently all methods were giving satisfactory results.

Niacin

A total of 15 different questionnaires were returned showing that niacin is being determined on meat. All the methods were microbiological and apparently were giving satisfactory results although some modifications were specified by various researchers. The method of Snell and Wright (J.B.C. 159:675) seemed to be the most common method.

Pantothenic Acid

Nine different institutions are apparently running assays for pantothenic acid. All methods are microbiological and are giving satisfactory results. The more commonly used methods are found in "Methods of Vitamin Assay" and J.B.C. 156:21 or are being modified as found in other methods.

Vitamin B6

In response to the question on pyridoxine, one reply (AMIF) pointed out that this vitamin should not be called pyridoxine but vitamin B6 as the vitamin group includes pyridoxal, pyridoxamine and pyridoxine, which are all of use to the organism. The questionnaire showed that six research groups were analyzing for vitamin B6 using various microbiological methods. The more common methods can be found in "Methods of Vitamin Assay" by Johnson and in the Analyst (70:283). One (Swift) research laboratory uses an unpublished method but are not sure as to the adequacy as yet, while another (Wisconsin) uses a modification of the yeast assay method in Ind. Eng. Chem. Anal. Ed. 15:141.

Folic Acid

Four questionnaires showed that assays for folic acid were being made with all using microbiological methods. Only two (Florida, New York) give references on folic acid methods which can be found in J. Bact. 55:869 and J.B.C. 152:157. All those reporting this assay are apparently in doubt as to the reliability.
Vitamin Bi2

Six replies to the questionnaire were positive in regard to assaying for vitamin Bi2. Three of the investigators were satisfied with the methods they were using (Wisconsin, MIT, AMIF) but the other three (Swift, Iowa, Florida) were not sure the methods were adequate. The more promising methods are apparently the U.S.P. method, the method of Thompson et al. (J.B.C. 164:175) and the method yet to be published by AMIF workers. The disagreement between workers using the same method in regard to results would indicate that a better assay is needed for Bi2 than is in common use.

Amino Acids

Twelve different research groups are engaged in assaying tissue for the various amino acids.

Lysine

Eight researchers indicated that they were analyzing for lysine. The two most common methods were the microbiological methods of Schweigert et al. (J.B.C. 180:1077) and of Dunn et al. (J.B.C. 156:703). One group (Montana) stated they run all assays by both the chromatographic and microbiological methods as a double check.

Tryptophane

Eleven groups are assaying for tryptophane with both colorimetric and microbiological methods being used by a number of individuals. The method of Graham et al. (J.B.C. 168:711) appears to be one of the more reliable microbiological methods, while the colorimetric procedure using p-dimethylamino-benzaldehyde suggested by Utah workers appears excellent for meats workers.

Valine, Isoleucine, Leucine, Methionine, Phenyalanine, Arginine, Histidine

Nine responses indicated that the above amino acids were being assayed, with the majority of the answers showing microbiological analyses most common. However, two (Montana, Ohio) use paper chromatography. Apparently the methods used are considered to be adequate as judged by the response. The more common methods can be found in J.B.C. 180:1077, Arch. Biochem. 10:427 and Tex. Exp. Sta. Bul. 708.

In addition, two other institutions ran analyses for certain of the amino acids. California made assays for all of the above list except isoleucine, while Utah workers determined methionine only using a colorimetric procedure.

Miscellaneous Amino Acids

Two institutions indicated that they made determinations on other amino acids. One (Utah) determined cystine colorimetrically and the other (Wisconsin) measured proline and tyrosine. Both groups indicated the methods were adequate.
Press Fluid

Total N

Only two groups (Kansas, BAI) determine total N, one using the AOAC method and the other using a micro-Kjeldahl after fat extraction (BAI).

NPN

This determination was used only by Kansas, where the method used was the 10% trichloroacetic acid method.

Fat

Fat was determined by three groups. The Kansas workers use the graduated centrifuge tube method and the BAI workers use the method outlined in Food Tech. 4:498. Missouri used the official AOAC method.

Phosphorus

Only two groups ran phosphorus determinations on press fluid. One (Missouri) used the official AOAC method while the other (Kansas) used the method found in Kans. Tech. Bul. 58 (p. 11).

Fat Tissue

Total N

Eleven groups indicated that they determine total N on fatty tissue. All of the responses showed that they use the Kjeldahl method of the AOAC. The respondents were apparently satisfied that this method was adequate.

Fat

A total of 13 questionnaires showed that fat was determined on fatty tissue. Seven groups used the official AOAC method. Two (Oscar Mayer, Cornell Med. College) used the soxhlet extraction method. Ohio used the method of Schmid (Anal. Chem. 27:464), Kansas used the modified Babcock milk test method and Wisconsin workers used the Goldfish Ether Extraction method. Wilson used the method previously described of refluxing a dried residue with skellysolve and filtering.

Moisture

Twelve institutions indicated that they determined moisture on fatty tissues. In general, the same methods that were used are found under determination of moisture in routine muscle determinations. Six used the AOAC method and with one exception were the same as previously given. The exception was the method of obtaining moisture by difference, that is 100 minus % protein / % fat / % carbohydrate / % ash = moisture (Cornell Med. College).

Ash

Nine respondents indicated that they determine ash on fatty tissues. The methods were the same as previously reported on routine muscle analysis with the AOAC method being most commonly used.
Phosphorus

Four institutions indicated that they make phosphorus determinations on fatty tissue. Three use the AOAC method and the other (Kansas) uses the method given in Kan. Tech. Bul. 58 (p. 12).

Rendered or Extracted Fat

Iodine No.

A total of 17 researchers are using iodine numbers. Eight are using the Hanus method as outlined by the AOAC and four use the Wijjs method. Four other groups utilize the method of the AOCS, while another laboratory (Ohio) uses either the Hanus or the Rosemund Kudenheim method. All groups indicate the methods are satisfactory.

Fat Acid Assay

Seven institutions stated that they made fat acid assays on rendered fat samples. Three of the replies (AMIF, Swift, Armour) indicated that they use the official method of the AOCS (Cd-7-48). One (Kingen) uses the method published in J.A.O.C.S. 26:399. Another (Syracuse U.) uses the method of Brice et al. (Oil and Soap 22:219) but states this method may not be reliable in the presence of highly oxidized fats. The other two (Montana, Massachusetts) fail to specify their method.

Free Fatty Acids

A total of 19 replies showed that free fatty acid determinations are being made on rendered fat. Six of the replies show that the method of the AOAC is being used, and five indicate that A.O.C.S. (Ca 5a 40) method is being utilized. Two groups (Oscar Mayer, Utah) use the method of Rockwood and Ramsbottom (Anal. Chem. 19:853). Kansas workers titrate in alcohol at room temperature and Ohio investigators use titration in alcohol-ether solution. The Canadian Nat. Res. Council workers use the method of Lea (J. Soc. Chem. Ind. 52: 9 T) and BAI workers use the method found in Ind. Eng. Chem. 19:853. Michigan uses the method of Halliday and Noble (Food Chem. and Cookery U. of Chicago Press, 1943), while Montana workers state the method depends on the circumstances.

Peroxide

A total of 21 questionnaires showed that peroxide numbers were being run. Eight of the replies showed they were using the Wheeler method or one of its modifications. Of those using this method, one (Armour) was uncertain as to the reliability, while another (Kingen) felt the method was not adequate but the remainder indicated they were satisfied with results. Three other replies showed they were using the method of Lea (Proc. Royal Soc. B. 108:175), with one (Kansas) finding the method to be satisfactory, another being uncertain (Can. Nat. Res. Council) and still another (Ohio) failing to indicate their experiences in regard to suitability. Two institutions (Oscar Mayer, Utah) indicated they have found the method of Rockwood and Ramsbottom (Anal. Chem. 19:853) to be adequate. Other groups use the methods of Watt and Feng, J. Home Ec. 39:88, (Michigan), of King et al., Oil and Soap June 1933, p. 105.
Melting Point

A total of 10 questionnaires indicated that melting point determinations were being made on fat samples. Four answers showed the AOAC method was being used and an equal number were using the AOCS method. Of the remaining two, one (Oscar Mayer) indicated they used titer and the other (Montana) stated they varied the method according to circumstances. All felt their method to be adequate.

Aldehydes

Five returned results showing that they tested for aldehydes. Two use the Shibsted method, with one (Oscar Mayer) being satisfied with the method while the other (MIT) reported the method to be inadequate. One (Armour) stated they found the Kreis test to be adequate while another (Montana) simply stated they varied the method depending on circumstances. BAI workers heated fat samples to 165°C for 15 minutes, steam distilled, and reacted the distillate with 2, 4 dinitrophenyl hydrazine. The hydrozones are extracted and absorbency is measured with the spectrophotometer.

Refractive Index

Eleven different research groups were determining the refractive index on fat samples. Three indicated that they were using AOCS method and were satisfied with the method, while three other investigators were using the AOAC method with good results. Three other investigators simply indicated that they used the refractometer and were satisfied with results. Another (Montana) failed to indicate the method used but marked it as adequate.

Saponification No.

Returned questionnaires indicated that saponification numbers were being run in seven laboratories. Four used the official AOAC method, while three used the official AOCS method.

Composite Samples (Sausage, etc.)

Due to the fact that no place was provided for cured meat methods on this questionnaire, a considerable number of replies indicated that it was considered under this heading subject.

Total N and NPN

Eleven researchers indicated that they made either N or NPN determinations or both. In general the sample methods were listed as found for muscle (routine) or fatty tissue.

Fat and Moisture

The same methods were used as have been previously listed with essentially the same degree of reliability being indicated.
Sulfites

Four replies showed that analyses were being made for sulfites, two of which (Armour, Swift) use the official AOAC method and find it to be reliable. Of the other two replies, one (MIT) states they distill into iodine, while the other (AMIF) use a modification of the Monier-Williams method but indicate uncertainty as to the adequacy of the method.

Benzoates

Two institutions (Armour, AMIF) indicated that they tested for benzoates by means of the AOAC method and found it to be satisfactory.

Chlorides

In general the methods of determining chlorides were the same as listed under minerals with the exceptions noted. Out of a total of 12 replies, six used the same methods as given previously. Two (Missouri, Utah) use the Volhard method as found in Scott's "Standard Methods of Chemical Analysis 5th ed. Vol. 1." Kansas researchers use an unpublished method, extracting the chlorides with boiling water by centrifuging, then they precipitate the proteins with Cd SO\(_4\) and NaOH and titrate the neutral filtrate with N/20 Ag NO\(_3\) using sodium chromate as an indicator. Two other replies indicate they use unpublished methods with one (North Carolina) being an electrometric procedure and the other (Schluderberg-Kurdle) failing to give any details of the method. Oscar Mayer researchers titrate with KCNS. All reported their methods to be satisfactory.

Nitrates

Six replies show that nitrates are being determined, with four indicating the use of the method of AOAC and find it to be satisfactory. Another (Montana) states they use their own unpublished method but do not give details, while the other (AMIF) use the method of Blake published by the American Inst. of Meat Packers in 1950. Satisfaction in all methods was expressed.

Nitrites

Nine answers show that nitrites are being determined. Five replies showed that AOAC method was being used. Swift used an unpublished spectrophotometric method and the AMIF used the method of Blake, both indicating the methods to be adequate. BAI workers use the method given in the Can. J. Res. D17:125, while Oscar Mayer researchers utilize a colorimetric procedure using sulfanilic acid and a-naphthylamine.

Borates

Only two groups (Armour, Swift) indicated that they test for borates, both using the AOAC method and finding it to be satisfactory.

Additional Methods Needed

As has been pointed out previously certain methods are apparently inadequate, whereas certain others look promising but need routine checks.
against more time consuming but reliable procedures. Since this phase has been pointed out previously such methods will not be delved into during this discussion but the suggestions included in the response to the questionnaire will be discussed.

As would be expected the most commonly expressed need is more reliable methods of sampling. This certainly warrants consideration of all meat workers since chemical methods are no more reliable than the sampling procedure.

One questionnaire indicates that one of the greatest needs is for an inert preservative which can be used in preventing the growth of microorganisms during accelerated tests on oxidative changes and enzymic reactions. Certainly, the use of a good preservative should merit our consideration as results reported from contaminated samples may differ widely from those occurring under normal conditions.

Another worthy suggestion is for reliable methods of measuring changes in the physical state of proteins during aging and cooking. This may prove an important clue in tenderization, freezing and curing studies.

One of the more common comments indicated that quick and reliable methods of determining the collagen and elastin content of meats are needed. Perhaps some of the newer methods are answers to this problem but the methods still need further verification.

One questionnaire indicated that a better method is needed for determining tocopherols, vitamin K and vitamin D. While one institution indicated that a good method is needed for determining the volatile amines in meat and meat products.

- - - -

CHAIRMAN HANKINS: Thank you, Dr. Hall, for a very fine analysis of the reports.

Dr. Pearson of the University of Florida is scheduled to lead the discussion.

DR. PEARSON: I am going to open the floor for any discussion. If you have any questions which you would like to address to Dr. Hall, please feel free to do so.

DR. DEATHERAGE: I was very much interested in his report concerning the use of tungstic acid and trichloracetic acid in the non-protein nitrogen determination.

We have tried in at least fifty cases, to correlate the changes in proteins that we know occur from taste panel work, and we get an entirely negative and different result. I will have to learn more of the methods that are being used by them. I might say that I do not have too much hope for the method at present.

I would like to comment that there is one thing that we have done in our laboratory on the fat determination, and this is to weigh
directly into an ice cream bottle, rather than to use a pipette or special funnel to transfer it into the Babcock bottle.

You can weigh your sample in an ice cream test bottle and put the stopper in, and proceed from that point, and you have no trouble with the transfer.

DR. PEARSON: Are there any other comments or questions at this time?

DR. KASTELIC: I would like to ask Dr. Deatherage here at what stage are you working with the specimen? Are you working with it right after the animal is killed? How long is it held, and what happened before you poured the acid?

DR. DEATHERAGE: We ran determinations of two days, and fourteen days, post mortem.

MR. SULZBACHER: I would like to ask if any evidence was shown in the questionnaire that some of the new so-called electronic machines for determining moisture were in use?

DR. HALL: I do not remember seeing any case of that. Nothing except the usual AOAC method for the most part.

DR. PEARSON: Along the line of moisture, I would like to inject this. I think perhaps, providing you are not anticipating the use of your sample for fat determination, which most of us wish to do, the benzine and toluene distillation method offers considerable proficiency if we are interested strictly in a moisture determination.

I have not used the method myself, but I know it has been used for grass with considerable success, and it should be adaptable to meats.

Are there any other questions?

All right, I think Dr. Hall has done a very good job in covering this subject.

Incidentally, he did practically all of the work in writing up the questionnaire, and in tabulating the replies.

CHAIRMAN HANKINS: Mr. Sulzbacher of the Bureau of Animal Industry will present the microbiological phase of the report. It is my pleasure to introduce Mr. Sulzbacher.

###