How to Spot a Fat Hamburger

Believe it or not (not Ripley’s, however), everyone needs FAT as a part of their regular diet to stay healthy. Fat plays an important role in the building of many organs, including the brain, liver, lungs, and kidneys. The absence of fat in a diet would prevent the normal development of these structures. Also, fats constitute a valuable source of energy for our daily needs. On the other hand, too much fat in the diet can have adverse effects. One such example is called Cirrhosis: caused by an accumulation of fat in the liver.

We need a balance for fat intake. Any less than twenty percent and more than twenty five percent of our caloric intake involving fat represents improper balance. The graph below shows the USRDA for fats, protein and carbohydrates.

100 %

% of Daily Food Intake

20 %

80 %

60 %

40 %

Carbohydrate

Protein

Lipid

Foods taste better because of the fats they contain. Too much fat, however, gives food a greasy taste. The amount of fat permitted in certain foods is regulated by law. For example, the maximum amount of fat permitted in ground beef is 30%, while that for lean ground beef is 15% or less. You might find it interesting to see how much meat is really in a hamburger!

**Materials** 2 Petri Dishes Calculator 100 ml Hexane (or similar solvent)

 250 ml Beaker Stirring Rod 1/8 pound hamburger (various sources)

 Data Sheet Excel Data Program Triple Beam Balance

# Procedures

1. Obtain several small (1/8 pound) samples of UNCOOKED, ground meat. Try to get a variety of meats. For example, obtain a sample from local fast food restaurants. Just explain that you are conducting a scientific investigation requiring uncooked hamburger meat.
2. Weigh an empty Petri dish to the nearest TENTH of a gram. Record this mass on the data sheet under “Petri Dish 1.”
3. Add 12.5 grams of the uncooked, ground meat to the empty dish. To do this, add 12.5 grams to the mass of Petri Dish 1 on the triple beam balance.

 [e.g. Petri dish 1 = 33.8 g + 12.5 g = 46.3 g on the triple beam balance]

 Record the mass of the hamburger on the data sheet under “Hamburger.”

1. Transport the 12.5 grams of hamburger from Petri dish 1 into a 250 ml beaker. Also, obtain a stirring rod. Keep Petri dish 1 for later use.
2. Add 12.5 ml of organic solvent (hexane or another appropriate solvent) to the meat and mix thoroughly for 15 to 20 minutes with a glass stirring rod. Do not use the solvent near any flames since it is very FLAMMABLE. The solvent will extract the fat from the meat.
3. Obtain a second Petri dish and measure and record the weight of PETRI DISH #2. The Petri dishes will be used to allow for evaporation of the solvent.
4. After thoroughly mixing the meat and solvent, CAREFULLY drain the liquid into Petri dish #1. Get as much of the liquid out of the beaker as possible.
5. Then, remove the hamburger from the beaker into Petri dish #2.
6. Use a piece of scrap paper with your name(s) and place the two Petri dishes at a reserved spot in the room. This will allow the solvent to evaporate overnight.

# Calculations and Data

1. The next day, weigh Petri dish #1 to the nearest TENTH of a gram on the triple beam balance. Petri dish #1 contains only the fat of the meat. Subtract the weight of Petri dish #1 from the weight you just determined (dish + fat). This calculation gives the amount of fat. Record this weight on your data sheet under “Fat” in the DATA table
2. Determine the percent of fat in the total 12.5 gram meat sample by placing your answer in the following equation: [*record the % fat on the CALCULATIONS table*]

 Weight of fat X 100% = **percent fat**

 12.5 g meat sample

1. Weigh Petri dish #2, which now contains only the meat. Subtract the weight of Petri dish #2 from the weight you just determined (dish + meat). This calculation gives the amount of meat. Record this weight on your data sheet under “Meat” in the CALCULATION table.
2. Determine the percent of meat in the total 12.5 gram meat sample by placing your answer in the following equation:

 Weight of meat X 100% = **percent meat**

 12.5 g meat sample

1. Lastly, determine the amount LEFT OVER using the following equation:

 % Fat + % Meat = 100% - \_\_\_\_\_ = **% Left Over**

1. Using the computers, you will create a spreadsheet using Word Excel in order to check all your data.

# Conclusions and Questions

1. Which brand of hamburger has the least amount of fat?
2. Do you think it is worth the price to buy the more expensive ground sirloin versus the less expensive lean ground beef?
3. Why doesn’t the %Fat and the % Meat add up to 100%. Name some things that might also be found in the meat.
4. Foods will often have a label that says, “100% Pure Beef.” Do you think this label is correct?

## Name \_\_\_\_\_\_\_\_\_\_\_ Calculations and Data Sheet

## Date \_\_\_\_\_\_\_\_\_ Hour \_\_\_\_

# Data Table

 **Source of Hamburger**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| **Petri Dish 1** | **Amt of Hamburger** | **Petri Dish 2** | **Amt of Fat** |
| g | 12.5 g | g | g |

# Calculations Table

|  |  |  |  |
| --- | --- | --- | --- |
| **% Fat** | **Amt of Meat** | **% Meat** | **% Left Over** |
| % | g | % | % |

SHOW ALL NECESSARY CALCULATIONS:

# Create an Excel Spreadsheet

1. Boot up one of the computers and log in.
2. Go to START 🡪 PROGRAMS 🡪 MICROSOFT EXCEL and click.
3. Click on Column A through H so that all 8 columns are highlighted.
4. Right click the mouse and find “Column Width” or click on FORMAT 🡪 COLUMN 🡪 WIDTH. Enter “10” in the box and click “OK
5. Go to FILE 🡪 PAGE SET UP 🡪 PAGE and click on “Page”.
6. Find the circle for “LANDSCAPE” and click on that.
7. Find MARGINS and change the right and left margins to 0.5. Click “OK”.
8. Click in Cell A1, type the Title used in the Data Table above: Petri Dish 1.
9. Click in Cell B1, type the Title used in the Data Table above: Hamburger.
10. Continue labeling all the columns on the Excel spreadsheet using the Headings from the Data and Calculations Tables above: *cell C1* 🡪 Petri Dish 2; *cell D1* 🡪 Amt of Fat; *cell E1* 🡪 % Fat; *cell F1* 🡪 Amt of Meat; *cell G1* 🡪 % Meat; *cell H1* 🡪 % Left Over.
11. Click in Cell A2, fill in the **value** (*not the unit*) you obtained for the mass of Petri dish 1 in grams from the Data Table. Do NOT put in the symbol or word for grams.
12. Click in Cell B2, fill in the **value** (*not the unit*) you obtained from the Data Table for the mass of Hamburger in grams (12.5). Do NOT put in the symbol or word for grams.
13. Click in Cell C2, fill in the **value** (*not the unit*) you obtained for the mass of Petri dish 2 in grams from the Data Table. Do NOT put in the symbol or word for grams.
14. Click in Cell D2, fill in the **value** (*not the unit*) you obtained by subtracting the mass of Petri dish 2 from the mass of the dish + fat. This is the amount of fat.
15. Click in Cell E2 and type the following: =D2/B2\*100 and click on the checkmark. This is the % fat. [*Be sure you use the correct key for multiplication*.]
16. Click in Cell F2, fill in the value you obtained by subtracting the mass of Petri dish 2 from the mass of the dish + meat. This is the mass of the meat without fat.
17. Click in Cell G2 and type the following: =F2/B2\*100 and click on the checkmark. This is the % meat.
18. Click in Cell H2 and type the following: = 100-E2-G2 and click on the checkmark. This is the % left over.
19. You may need to highlight Columns A through H and go to FORMAT 🡪 CELLS 🡪 NUMBER 🡪 DECIMAL PLACES = 0 and click “OK”.
20. Go to FILE 🡪 Save As 🡪 find your log in account 🡪 click on the third yellow box and type the word “Projects in Science” in the new folder dialog box 🡪 Click “OK” and then type the name “Hamburger” for the file name. Click “OK”.
21. Check all your results and be sure that your results match the EXCEL results.

# Conclusions and Questions

1. Which brand of hamburger has the least amount of fat?

2. Do you think it is worth the price to buy the more expensive ground sirloin versus the less expensive lean ground beef? Why or why not?

3. Why doesn’t the %Fat and the % Meat add up to 100%. Name some things that might also be found in the meat.

4. Foods will often have a label that says, “100% Pure Beef.” Do you think this label is correct? Why or why not based on this lab?