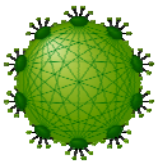

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The water uptake of dietary fibres - HUSK

Investigating a commercial dietary supplement called HUSK containing purified husks from an Indian medicinal plant

Aim

The purpose of the experiment is to investigate how much water a defined amount of fibre can absorb and how this affects the structure of the formed lump. During the investigation you can observe:

The amount of water absorbed by different amounts of water and judge which is the right amount of water needed to form a firm but flexible lump.

The surface change of the lump by touching the surface and feeling whether it is hard, dry or slimy.

The structure of the lump by investigating how it deforms with the different amounts of water.

The ability of the lump to float on water.

Introduction

The “fibre-hypothesis” has been proposed by two English doctors who claimed that there was a connection between life style illnesses in the industrialised world and the lack of plant fibres in food. One of the scientists, Burkitt has presented this hypothesis in a very simple and illustrative way; he claims that you can check for yourself whether you eat enough fibre by noting whether you are a “floater” or a “sinker”, because with a healthy fibre intake your faeces float on water. This can be obtained by a daily intake of 30-35g of fibre. In Denmark in 2000 cereals accounted for 63% of fibre intake, 26% came from vegetables and 9% from fruit, with 2% from other sources. In other countries this may be very different as it depends on the food traditions and the availability of plant fibre sources. In Africa’s rural areas, where Burkitt studied the nutritional effects of plant fibres, the daily amount of fibre is 100-175g.

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The uptake of water by plant fibres has a significant effect on digestion. It makes the faeces smoother, which stimulates the peristaltic movement of the intestines.

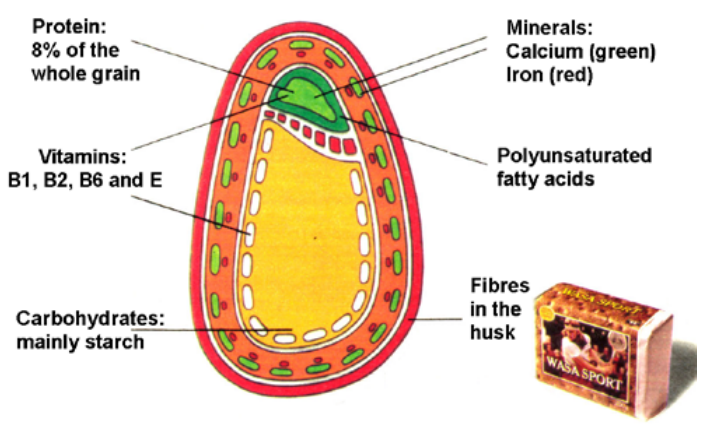


Figure 1: An overview of the components of the whole grain, as viewed in an educational WASA advertisement from the eighties.

The faeces then pass much faster through the system which leads to the hypothesis that hazardous substances in the food have less time to do damage of all kinds. For many Europeans the stimulating effect of fibre on digestion is a good enough reason to eat more fibre products since many people suffer from indigestion caused by an inactive life style and unhealthy food habits.

But what if you cannot get the daily intake of 30g of fibre? In Denmark, and probably many other countries, you can buy fibre as a kind of medicine. HUSK is such a product. It is made out of the husks of the Indian plant *Plantago psyllium*. It consists of almost 100% plant fibre and a teaspoon of the product with each meal three times a day turns you into a "floater". The question remains whether this is enough to replace the beneficial effects of the natural fibre content of food. But for fighting indigestion it is invaluable and is recommended by many doctors (see the company's product description at the end of this protocol).

Materials

Used by each group or person

100 mL measuring cylinder

6 disposable glasses of at least 150 mL – the kind used for beer has the right size

1 beaker of 10 mL, used to measure the amount of HUSK (do not use the measuring spoon from the package)

6 disposable plastic spoons

6 small plastic plates or 1 big plate

A big bucket of water

HUSK (for supplier information see "guide to protocol")

Tap water

Figure 2: Important !
It is practical to use disposable glasses, spoons and plates since HUSK is very sticky and even dishwashers cannot cope with it.

Procedure

Take 10 mL of dry HUSK fibre and transfer it to a big beaker / plastic beer glass.

Although the product HUSK is an approved dietary supplement you should not eat it in school.

Repeat this until you have 6 glasses with the same amount of fibre in each glass.

Mark the glasses 10, 25, 50, 75, 100 and 125.

Take the glass marked 10 and add exactly 10 mL of tab water.

Use a plastic spoon and stir for some time.

Repeat this with 25, 50, 75, 100 and 125 mL using the labelled glasses. (Do not add water unless you have time to stir.)

Wait for a minimum of 5 minutes after stirring, then transfer the content of each beaker either all together on one big plate or each separately on 6 small plates. Observe how the fibre lump flows when pouring it on to the plate.

Fill a bucket of water for floating tests.

Results

Describe the toughness of each lump – you can touch it with your hand. Can it easy change shape?

Feel the surface of the lumps and check whether it feels hard, dry or slimy.

Compare the six lumps and judge which one has the right shape and texture – right meaning not too dry and not too wet and maintaining a coherent and smooth shape.

Calculate how much water this lump can hold in % by taking the 10 mL dry HUSK to be 100%.

Take this lump and place it gently on the surface of water in a bucket. Describe the floating ability and observe whether or not the lump disintegrates.

If there is time you can check other lumps (for example 10 and 125) the same way.

Prior knowledge and teaching tips

Discussion

The experiment is easy to perform and the visual and tactile evaluation makes it fun for pupils of all ages. The results are obvious and the benefit of fibre for digestion is easy to recognize. The association of the shape and the “feeling” with the pupils own faeces are intentional, but as a teacher you should be aware that some pupils find this disturbing.

Open ended investigations

You can repeat the experiment with different liquid foods like milk, juice, soft drinks, wine and so on.

Questions for discussion

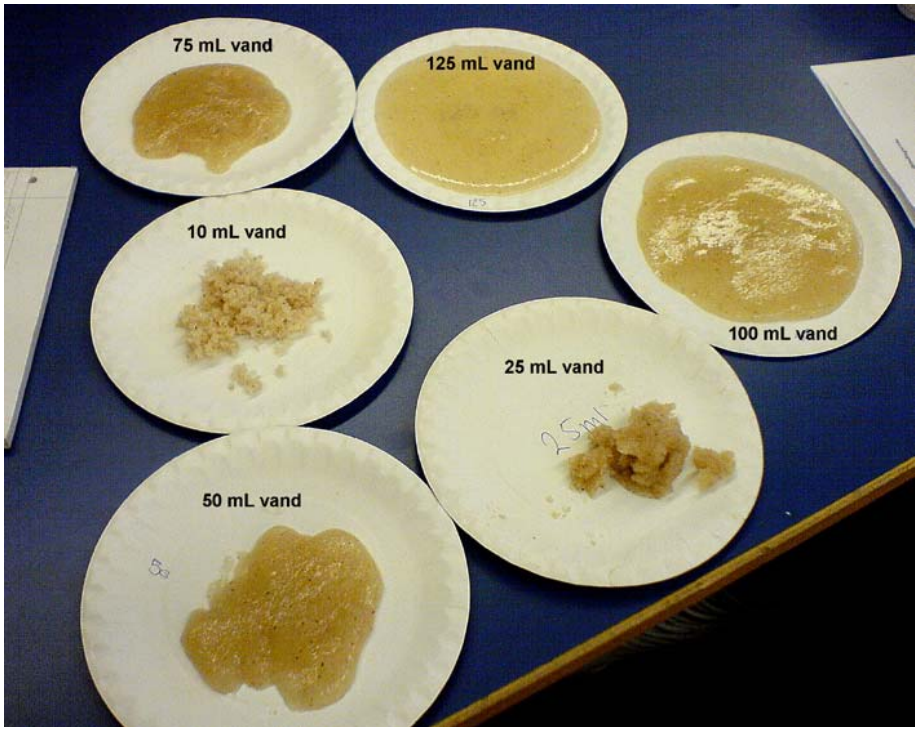
Use also the product information for answers.

What is the main ingredient in HUSK? Why is this beneficial?

Why does HUSK improve digestion? Compare the product information with your own results.

You need to drink a lot of water together with HUSK. How can this be explained by your results?

What are the reasons for the side effect 2 mentioned in the product information?



What is the problem with taking an overdose? Can you explain it on the background of your experiment?

What happens if you store HUSK in humid conditions?

Can HUSK also be used when having diarrhoea?

Practical tips

Safety guidelines

There is no risk using this product in experiments as long as you do not eat it. You have to consult a doctor for guidelines about eating HUSK.

Storage of materials

HUSK can be stored for a long time, see also the information on the package.

Disposal of waste

Pack the plates with HUSK lumps in a big plastic bag, close the bag with a firm knot and put it in a dust pin.

Preparation and timing

The experiment takes 45 min.

Literature

For more literature, both English and Danish see:

www.volvoxdk.dk

Acknowledgement

The protocol was developed in 2005 for teacher education as part of the collaboration between FaDB (The Danish Association for Biologists) and Solroed Gymnasium, Denmark.

This material is based on the Danish material "*Biologiske Småforsøg", BioFag Særnummer 2006* written by the authors for FaDB members.

Thanks very much to John Watson for valuable help with the English translation.

This protocol is part of the Volvox project and is funded under the Sixth Framework Program of the European Commission.

Figure 4: HUSK + 25 mL of water - VERY DRY

Figure 5: HUSK + 50 mL of water - JUST HOLDING TOGETHER

Figure 6: HUSK + 75 mL of water – PERFECT

Figure 7: HUSK + 100 mL of water - TOO WET

Product information

Supplier

W.Ratje Frøskaller ApS, Kirstinehøj 38 B, DK 2770 Kastrup

When to use HUSK

HUSK is well suited for fighting occasional indigestion and irritable colon in order to normalise intestinal function and soften faeces when having haemorrhoids or scratches around the anus.

HUSK helps lowering cholesterol.

HUSK can be used during pregnancy, because it is a 100% natural product consisting of white husks from Plantago psyllium.

HUSK can be used by people allergic to gluten.

HUSK is free of food additives and does not cause addiction.

How does HUSK work

Fibres are important in your diet. As a kind of massage of the walls of the intestines HUSK strengthens the muscles of the intestines and their ability to contract in order to improve transport of the content. HUSK is like other plant fibres difficult to digest. On the passage through the intestinal system they absorb water and swell, at the same time producing a vegetable slime, which makes the faeces glide smoothly and protects the inner wall of the intestines. The faeces obtain a more flexible structure in order to improve peristaltic movement.

HUSK on a daily bases

It is essential for your wellbeing that your digestion is working without problems. Therefore you need fibre and water in adequate amounts. Take 1-2 times a day a spoon of HUSK together with 2½ dl water (1 big glass). To normalize irritable colon we suggest using HUSK for at least a month. If you have regular indigestion problems you can use HUSK daily as prevention.

Dosage

Adults: 3-5g 1-2 times a day morning and evening

Children after the age of 6: 1,5g 1-2 times a day morning and evening

HUSK is stirred into 2 dl of water or juice, drink immediately. Thereafter drink an additional 1-2 dl of water. You also can use HUSK in yoghurt, but drink at least 2-3 dl of water together with it.

Side effects

1 - There have been occasional reports of allergy.

2 - When starting to use HUSK it can give you some pain and air in the intestines for some days.

Overdose

Too much can stop digestion, especially combined with low intake of water.

Storage

Store dry at room temperature. Keep away from children.