

## Home brewery as science investigation

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Part of the compulsory program in primary school is to promote the cross-curricular links among different subjects, days of science in particular make this possible.

We organize these days like science investigations for 9th graders. They do some research on the first day and present the results on the second day. Because some experiments with living beings last for a long time, we have at least a two week long break. In the meantime children are encouraged to work on their project, they search for better solutions, do some extra measurement, etc. Students are also stimulated to upgrade their knowledge, be innovative, to come up with individual contributions in the presentations and actively participate in the debate at the plenary presentation at the end of the second day.

We offer different workshops to children (catalysts, smart cars, electronics in the hen house, plants in the universe, solar panel and home brewery) but we follow the same objectives like being able to plan a simple scientific investigation (form the question, hypothesis, variables, etc.), being able to use tools and technology for experimenting, collecting and presenting data with critical evaluation, being able to share and present new information.

Pupils that choose home brewery are invited to come up with a statement like "Brewer agency has prepared a contract to investigate the influence of different ingredients in beer production with a purpose of preparing beer with the highest amount of alcohol."

They start investigating at home by looking into how beer is made and according to the statement they also form questions, hypotheses, variables and make a plan.

At school they form groups, present their plans and discuss best options to make a beer. They join their forces and each group prepares beer in the same way, changing only one variable (for example: added sugar, type of cereal).

During making beer students also acquire other skills through the following activities:

- Measuring sugar with Benedict solution and starch with iodine solution in malt before and after soaking.
- Detecting carbo - dioxide with the use of indicators (bromothymol blue, litmus) or with the limewater test.
- Preparing a microscope slide and use the microscope to observe the yeast.
- Making a scientific drawing.
- Taking pictures about their work to gather the right material for the final report.

On the second day they measure the alcohol content and verify their hypotheses. They write a report using the scientific ideas, think how to improve the experiment and how to apply it in every-day life. However, it is important to mention that alcohol can be dangerous. The results are presented at the plenary presentation, students make posters or computer presentations by using their own devices.