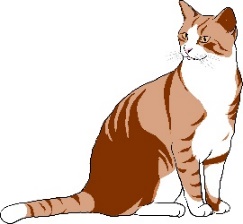
**Food web discussion**

Lucy made this food web diagram.

cat



thrush



chaffinch

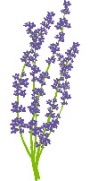


bee



caterpillar

lavender



cabbage

The food web diagram shows feeding relationships in Lucy’s garden.

**To talk about in your group:**

1. How many food chains are shown in the food web diagram?
2. How many producers are there in the food web?
3. How many consumers are there in the food web?
4. Which organisms are eaten by more than one thing?
5. Which organisms are in competition for the same food?
6. Lucy eats cabbages from her garden. How would you add this information to the food web?

*Biology> Big idea BOE: Organisms and their environments > Topic BOE1: Interdependence of organisms > Key concept BOE1.1: Food chains and food webs*

|  |
| --- |
| **Response activity** |
| **Food web discussion** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Feeding relationships within a community of organisms can be modelled using food chain and food web diagrams. |
| Observable learning outcome: | Recognise that food web diagrams represent several interconnected food chains within a community of organisms |
| Activity type: | Discussion |
| Key words: | food chain, food web, producer, consumer, prey, predator |

This activity can help develop students’ understanding of food webs through small group discussion. It can be used in response to the following diagnostic question:

* Diagnostic question: Food web

**What does the research say?**

Food chains and food webs are models – they are simplified representations of feeding relationships in a community of organisms (Griffiths and Grant, 1985). However, ample research suggests school-age children struggle to interpret food chains and food webs.

Confusion about the direction and meaning of the arrows in a food chain is a commonly reported misunderstanding (Gallegos, Jerezano and Flores, 1994; Gotwals and Songer, 2010), and suggests that students interpret the arrow to mean “eats” (Allen, 2014). Most of the students in the study by Barman et al. (1995) placed the arrows the wrong way around (e.g. from predator to prey) when asked to assemble a food chain using pre-printed cards, yet when presented with a correct depiction of a food web they did not question the direction of the arrows even though in most cases they contradicted the students’ own constructions.

Research has shown that when students are asked to predict possible effects of a change in a population within a food web, they tend to focus only on single food chains within the web, struggle to trace changes through more than one chain, struggle to think about the impact of a change in a population more than one trophic level away, and are more able to trace changes upwards through a chain than downwards (Webb and Boltt, 1990; Leach et al., 1992; Gotwals and Songer, 2010).

Food webs are key concepts that enable the development of understanding of more complex ecological principles and environmental issues, including population management and food security (Alexander, 1982). As Allen (2014) has pointed out, “Anyone who is not able to fully appreciate the far-reaching impacts of changes to a single population may trivialize a media report about an endangered species, only believing that species alone is under threat, when the likelihood is that many members of an ecosystem will be adversely affected”.

**Ways to use this activity**

Students should complete this activity in pairs or small groups. The focus of the activity should be on group discussion to decide how to answer the questions on the worksheet. It is through the discussions that students can check their understanding and develop their explanations. Listening in to the conversations of each group will often give you insights into how your students are thinking.

The quality of the discussions can be improved with a careful selection of groups; or by allocating specific roles to students in the each group. For example, you may choose to select a student with strong prior knowledge as a scribe, and forbid them from contributing any of their own answers. They may question the others and only write down what they have been told. This strategy encourages contributions from more members of each group.

After their discussions, each group should be prepared to report the key points of their discussion to another group, or to the class.

**Expected answers**

1. Five food chains are shown in the food web, i.e.:

cabbage ---> caterpillar ---> chaffinch ---> cat

cabbage ---> caterpillar ---> thrush ---> cat

lavender ---> bee ---> thrush ---> cat

lavender ---> caterpillar ---> chaffinch ---> cat

lavender ---> caterpillar ---> thrush ---> cat

1. There are two producers: cabbage and lavender.
2. There are five consumers: caterpillar, bee, chaffinch, thrush and cat.
3. The following organisms are eaten by more than one thing: lavender (eaten by caterpillar and bee), and caterpillar (eaten by chaffinch and thrush).
4. The following organisms are in competition for the same food: caterpillar and bee (competing for lavender), and chaffinch and thrush (competing for caterpillar).
5. Lucy should be added to the food web as follows: an arrow should start at the cabbage and end with the arrowhead next to Lucy; there should not be any other arrows linking any other organisms to Lucy.

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Images: cabbage – pixabay.com/OpenClipart-Vectors (1299145); caterpillar – adapted by UYSEG from pixabay.com/Clker-Free-Vector-Images (30648); chaffinch – pixabay.com/OpenClipart-Vectors (153030); lavender – pixabay.com/55rova (3237000); bee – pixabay.com/Clker-Free-Vector-Images (297305); thrush – adapted by UYSEG from pixabay.com/OpenClipart-Vectors (2028579); cat – adapted by UYSEG from pixabay.com/freeboi (3888093)

**References**

Alexander, S. K. (1982). Food web analysis: an ecosystem approach. *American Biology Teacher,* 44**,** 189-190.

Allen, M. (2014). *Misconceptions in Primary Science, 2nd* ednBerkshire, UK: Open University Press.

Barman, C. R., Griffiths, A. K. and Okebukola, P. A. O. (1995). High school students' concepts regarding food chains and food webs: a multinational study. *International Journal of Science Education,* 17(6)**,** 775-782.

Conkey, A. A. T. and Green, M. (2018). Using place-based art education to engage students in learning about food webs. *Journal of Instructional Pedagogies,* 21.

Gallegos, L., Jerezano, M. E. and Flores, F. (1994). Preconceptions and relations used by children in the construction of food chains. *Journal of Research in Science Teaching,* 31(3)**,** 259-272.

Gotwals, A. W. and Songer, N. B. (2010). Reasoning up and down a food chain: using an assessment framework to investigate students' middle knowledge. *Science Education,* 94(2)**,** 259-281.

Griffiths, A. K. and Grant, B. A. C. (1985). High school student's understanding of food webs: identification of a learning hierarchy and related misconceptions. *Journal of Research in Science Teaching,* 22(5)**,** 421-436.

Leach, J., et al. (1992). Progression in conceptual understanding of ecological concepts by pupils aged 5-16. University of Leeds, UK: Centre for Studies in Science and Mathematics Education.

Webb, P. and Boltt, G. (1990). Food chain to food web: a natural progression? *Journal of Biological Education,* 24**,** 187-190.