BCSPCA Humane Education

Grades: 6 - 9

Home Sweet Home?

Overview:

Students will use their math skills as they investigate different housing systems for chickens. Students will be provided with measurements for a barn and will determine the number of hens, eggs and income per month for each housing system. This activity will allow students to solve mathematical problems, think critically and make choices that are in sync with their values.

Materials:

Cluck! video, "Home Sweet Home worksheet" (optional: calculator)

Key Questions:

- What is life like for egg-laying hens in the different housing systems? (caged, free run, free range, and organic systems)
- Do hens deserve the same 5 freedoms as our pets? Why?
- Are hens able to express their natural behaviours in each housing system? Why or why not?
- What are the different conditions in which chickens are typically raised in?
- Why would a farmer choose to house hens in a way that is more expensive than other housing systems?
- How much living space is necessary for chickens to have good welfare?

Big Idea:

- Solve Mathematical problems in contextualized situations
- All living things sense and respond to their environment
- Questioning what we hear, read and view contributes to our ability to be educated and engaged citizens

**curriculum links listed at the end of this packet*

Activity:

Complete this activity after the Farm-Food Connection presentation or have students watch the 30 minute ***Cluck!*** Video series. Alternatively, students can watch Episode 5. Living Conditions, a 5-minute segment that contains the minimum information necessary to complete this activity.

Additional Resources

spca.bc.ca/teacher-resources

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Using the measurements provided for each housing system*, students will calculate the number of hens, eggs and income per month.

They will think critically to explain why farmers might choose to use one housing system over another.

*To simplify this calculation, students will calculate the number of hens as if the whole housing system space was used entirely for hens. To give a more realistic comparison in hen numbers (6:1 ratio of caged birds to free range birds as seen in the video) they will calculate the caged hens at three cages stacked even though the video showed four cages stacked. Please discuss this information beforehand with the students.

Background Information:

The battery cage farm in the video housed approximately 33,000 hens and is 14,400 ft2 (13,378,038cm2). The barn at Rabbit River Farms houses 5,000 hens and is 12,160 ft2 (11,297,009 cm2). The space in these barns is not used entirely for hens. There is space dedicated to equipment and walking paths. Each farm employs a similar number of employees. The mortality rate of hens in each housing system is also very similar.

Questions for Discussion:

- What do the majority of consumers buy, and why?
  - Note: Most consumers buy the cheapest eggs, these are produced by caged hens. However, if the demand changes then producers will have to change their methods.
- Should animal welfare be considered when raising animals for food? Who should determine the level of welfare required?
- Based on your knowledge of animal welfare and the numbers that you have just calculated, if you were starting an egg farm business which would you choose and why?
- What mathematical techniques did you use to get your answers, and why?

Modifications:

- Give students the additional help sheet (found on pg. 7) for steps and tips on how to complete the problems.
- Give students the table that includes a few answers already in the table. It will allow students the opportunity to check their work.

- For younger classes or classes with a high ELL population, work together as a group. Discuss the different housing types as a group, then complete the first two questions together. Have students complete the final two questions on their own as reflection.

Extensions:

- Have students research the typical housing systems for another farm animal and determine the average amount of space provided for them. Ask your students: Is this information to easy to find? If you were able to find all of the necessary housing information, could you use the same mathematical techniques to determine the number of animals kept in that housing system? What about the farmer's monthly earnings?

Home Sweet Home? Answer Key

	Conventional Cages	Enriched Cages	Free Run	
			Partial Slats	All Litter
Hens	83,100	66,900	14,400	7,000
Eggs	2,493,000	2,007,000	432,000	210,000
Dozen Eggs	207,700	167,300	36,000	17,500
Income	$502,600	$423,300	$103,000	$50,100

	Free Range		Organic
	Partial Slats	All Litter	Partial Slats & All Litter
Hens	14,400	7,000	8,000
Eggs	432,000	210,000	240,000
Dozen Eggs	36,000	17,500	20,000
Income	$126,700	$61,600	$85,400

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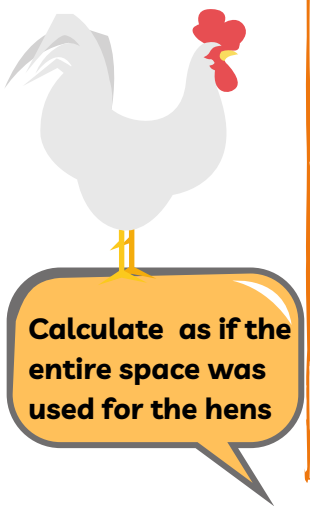
cm²/hen

Housing System	Wire Cages	Partial Slats	All Litter
Conventional Cages*	483		
Enriched Cages*	600		
Free Run*		929	1900
Free Range*		929	1900
Organic (always Free Range)		1666 + 2500 outdoor space	1666 + 2500 outdoor space

*as outlined in the Canadian Codes of Practice for Poultry-Layers



More space is required if a farmer uses **all litter** in order to provide absorption for the droppings. All litter or partially littered floor, must be monitored and wet litter removed regularly or more litter added to prevent the hens from walking in their droppings.

Partial slats is a combination of slats and litter. This means not as much space is required as an all litter floor because this system helps keep most of the droppings out of the litter area. Although hens are able to engage in foraging behaviour and dust bathing, farmers are only required to allocate 15-30% of the usable space to litter. These spaces can become very crowded, restricting their ability to engage in their natural behaviours.

Step 1. On a separate piece of paper, use the table above to determine the number of hens that can be kept in a 13,378,038 cm2 barn for each housing system**. Remember that for cage systems, cages can be stacked.** To calculate this, determine the number of hens for floor space x 3 cages stacked. Round your answers to the nearest 100. Write your answers in the tables on the next page.

On average, there are 30 days in a month

Step 2. Using the numbers from your table above, calculate how many eggs are produced in one month, based on one hen laying an egg every 24 hours. Write your answers in the tables on the next page. Then calculate how many dozens of eggs this equals, and input the result into the tables.

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Step 3. Here is the price farmers get per dozen of large eggs. Calculate the monthly income for the farmer for each housing system. Write your answers in the tables below.

Price per dozen of large eggs:

- Caged: $2.42
- Enriched: $2.53
- Free Run: $2.86
- Free Range: $3.52
- Organic: $4.27

Remember to round your answers to the nearest 100

Answer from Step		Conventional Cages	Enriched Cages	Free Run	
				Partial Slats	All Litter
1	**Hens**				
2	**Eggs**				
2	**Dozen Eggs**				
3	**Income**				

Answer from Step		Free Range		Organic
		Partial Slats	All Litter	Partial Slats & All Litter
1	**Hens**			
2	**Eggs**			
2	**Dozen Eggs**			
3	**Income**			

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4. Answer the following questions:

a. Based on your findings, why do you think some farmers would choose to use a housing system that does not generate as much profit?

b. Based on your knowledge of hen welfare in the different housing systems, if you were starting an egg farm business which housing system would you choose and why? Based on your answers to question 3, what could be your potential yearly income?

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Additional Help Sheet

The numbers in this table are the area needed per hen in cm2

cm²/hen

Housing System	Wire Cages	Partial Slats	All Litter
Conventional Cages*	483		
Enriched Cages*	600		
Free Run*		929	1900
Free Range*		929	1900
Organic (always Free Range)		1666 + 2500 outdoor space	1666 + 2500 outdoor space

*as outlined in the Canadian Codes of Practice for Poultry-Layers

1. Using the table above, determine the number of hens that can be kept in a 13,378,038 cm2 barn for each housing system**.** Round your answers to the nearest 100. Write your answers in the blank tables.

Housing system area divided by area needed for each hen based on the type of housing system (i.e., the number given to you in the table above).

**** Remember that caged hens are stacked, so you need to multiply the number for caged hens by 3.**

2. Using the numbers from your table above, calculate how many eggs are produced in one month, based on one hen laying an egg every 24 hours. Write your answers in the tables on the next page. Then calculate how many dozens of eggs this equals, and input the result into the tables.

Multiply the number of hens (that you just calculated) by 30 (as 30 represents one egg per day for 30 days).

Divide the number you got by 12 to determine how many dozens of eggs it represents.

3. Here is the price farmers get per dozen of large eggs. Calculate the monthly income for the farmer for each housing system. Write your answers in the tables on page 2.

Price per dozen of large eggs:

- Caged: $2.42
- Enriched: $2.53
- Free Run: $2.86
- Free Range: $3.52
- Organic: $4.27

Multiply how many dozen eggs by the price per dozen to determine the monthly income.

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Home Sweet Home? Curriculum Links

Curricular Competencies and Content:

Math:

- Use reasoning and logic to explore, analyze, and apply mathematical ideas
- Demonstrate and apply mental math strategies
- Model mathematics in contextualized experiences
- Apply multiple strategies to solve problems in both abstract and contextualized situations
- Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
- Explain and justify mathematical ideas and decisions
- Communicate mathematical thinking in many ways
- Represent mathematical ideas in concrete, pictorial, and symbolic forms
- Reflect on mathematical thinking
- Connect mathematical concepts to each other and to other areas and personal interests
- Use mathematical arguments to support personal choices

Social Studies:

- Use Social Studies inquiry processes and skills to - ask questions; gather, interpret and analyze ideas; and communicate findings and decisions
- Construct arguments defending the significance of individuals/ groups, places, events or developments (significance)
- Differentiate between short- and long-term causes, and intended and unintended consequences, of events, decisions, or developments (cause and consequence)
- Make ethical judgements about events, decisions, or actions that consider the conditions of a particular time and place, and assess appropriate ways to respond (ethical judgement)

Core Competencies:

Communication:

- I communicate clearly and purposefully, using a variety of forms appropriately.

Thinking:

- I can evaluate and use well-chosen evidence to develop interpretations; identify alternatives, perspectives, and implications; and make judgments. I can examine and adjust my thinking.
- By exploring their own basic needs and comparing them to the needs of animals, students think critically about how their personal decisions also affect other lives, their community, and the environment.

Personal and Social:

- I can take purposeful action to support others and the environment.