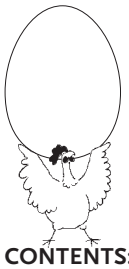
WELCOME TO THE

EXTRAORDINARY EGG SERIES



TECHNOLOGY & EGG PRODUCTION

An exploration of:

- the effect of technology on egg production practices
- the affect these technological changes have on the quality of life for the hen, the farmer and the consumer

SUGGESTED SUBJECT AREA & GRADE LEVEL

Social Studies: Industrialisation and Economies; Technology and the agriculture industry, Grade 9

CONTENTS:

This module is one in a series of five that has been developed by the Canadian Egg Marketing Agency and the Provincial Egg Boards.

- **THE NUTRITIVE VALUE OF EGGS**
- **COOKING WITH EGGS**
- **TECHNOLOGY AND EGG PRODUCTION**
- **CHOLESTEROL PERCEPTIONS AND FACTS**
- **MICROORGANISMS AND OUR FOOD**

For more information contact your Provincial Egg Board or visit our WEB site: WWW.CanadaEgg.ca

TECHNOLOGY & EGG PRODUCTION

UNIT PLAN

The activities in this unit focus on two areas:

HOW EGG PRODUCTION HAS CHANGED

Using reference materials, students explore the current and past egg production practices.

THE IMPACT OF TECHNOLOGY

Through research and case study, students evaluate the impact of technological changes in production practices on the quality of life for the hen, the farmer and the consumer.

LEARNER EXPECTATIONS

Students will:

- Identify changes in egg production practices due to technology and automation
- Identify and compare historical farming practices versus modern commercial production
- Evaluate the impact of technological changes on the quality of life for the hen, the farmer and the consumer

HOW EGG PRODUCTION HAS CHANGED

The development of technology has allowed agricultural practices to change.These technological changes affect the way agricultural work is carried out. Students will research changes in egg production.

RESOURCES REQUIRED:

Student Worksheet: How Egg Production Has Changed

Brochure: The Extraordinary Egg

Video: The Extraordinary Egg

ACTIVITIES:

Show students the video, "The Extraordinary Egg", on present day egg production.

Discuss and list some of the ways technology has changed production practices. Have students prepare a chart contrasting past and present practices using the worksheet, "How Egg Production Has Changed". Suggested categories for comparison include; Housing Systems, Feeding and Collection Systems, Storage and Transportation Practices.

Discussion questions:

Housing Systems

How have barns changed?

Are hens housed differently?

What type of protection was provided from the elements (heat, cold, wind) in the past?

– How is it done now?

How was waste (manure) managed in the past?

Feeding and Collection Systems

How did hens get food and water?

How has the collection of eggs changed?

Storage and Transportation Practices

How does technology help ensure that consumers get fresh, safe, quality eggs?

THE IMPACT OF TECHNOLOGY

Through research and discussion, students explore and evaluate the pros and cons of the changes brought about by technology on the various stakeholders (hen, farmer, and consumer).

RESOURCES

Student Worksheet:	The Impact of Technology
Handouts:	Egg Facts
	Case Study – Production Past and Present
Brochure:	The Extraordinary Egg
Video:	The Extraordinary Egg

ACTIVITIES

Have students work in groups to research the pros and cons of the various technological changes in production practices, and their affects on the quality of life for the hen, farmer and consumer. In addition to the video and brochure, "The Extraordinary Egg", the handout, "Egg Facts", provides students with comparative data for evaluation. The case study also presents various facts and points of view to help students evaluate the impact of technology on the egg industry and society.

Possible factors for exploration are outlined below. "The Impact of Technology" worksheet guides the students through their research.

Factors for exploring the impact of technology:

Health

What impact did the changes in production practices have on the following health issues? Consider the farmer, hen and consumer in your research.

- disease control
- exposure to dust, fumes, etc.
- safety of product
- use of antibiotics
- handling of waste products
- nutritional value for consumer
- freedom from malnutrition for hen
- other

Environment

What effect did automation and technology changes have on the physical and psychological well being of the farmer and hen? Was there any impact on the consumer? Consider the following factors in your research.

- physical comfort; protection from cold and heat
- protection from predators
- freedom from injury (fighting, and feather picking by laying hens)
- freedom to express most normal, socially acceptable patterns of behaviour for hens
- other

Productivity

How did the technological changes affect productivity? What affect does productivity have on the hen, farmer and consumer?

- amount of eggs laid by hen
- number of broken or lost eggs
- economic viability of egg farmers to make a living
- cost and quality for consumer

Have students review their lists and classify the change as either having a positive impact for society (or pro technology) or a negative impact for society (or a con for technology).

After students have rated each item individually have them vote on whether the overall changes brought about by technology were positive or negative for society.

Have students propose changes they would recommend to current egg industry practices.

HOW EGG PRODUCTION HAS CHANGED

	PAST	PRESENT
HOUSING SYSTEMS		
FEEDING AND COLLECTION SYSTEMS		
STORAGE AND PRACTICES		

HOW EGG PRODUCTION HAS CHANGED

	PAST	PRESENT
HOUSING SYSTEMS	– *loose housing (no cages)* – *dirt floors* – *wooden barn construction with no insulation* – *barn door for ventilation* – *natural daylight* – *wastes dropped throughout barn and yard*	– *cages* – *concrete or cement floors* – *metal barn construction with insulation* – *exhaust fans, heaters* – *automatic lighting controls* – *wastes removed daily as they automatically drop into disposal pits under cages, or onto disposal belts*
FEEDING AND COLLECTION SYSTEMS	– *hunt and peck for feed and water* – *antibiotics used in feed* – *hand collection of eggs throughout* – *barn yard*	– *automatic dispensing of feed and water* – *antibiotics eliminated* – *automatic collection of eggs*
STORAGE AND PRACTICES	– *room temperature storage of eggs* – *standard trucks* *controlled trucks*	– *coolers for storage* – *insulated or temperature*

THE IMPACT OF TECHNOLOGY

HEALTH

What impact did the changes in production practices have on the following health issues? Consider the farmer, hen and consumer in your research.

– disease control

– exposure to dust, fumes etc.

– safety of product

– use of antibiotics

– handling of waste products

– nutritional value for consumer

– freedom from malnutrition for hen

– other

ENVIRONMENT

What effect did automation and technology changes have on the physical and psychological well being of the farmer and hen? Was there any impact on the consumer? Consider the following factors in your research.

– physical comfort; protection from cold and heat

– protection from predators

– freedom from injury (fighting, and feather picking by laying hens)

– freedom to express most normal, socially acceptable patterns of behaviour for hens

– other

PRODUCTIVITY

How did the technological changes affect productivity? What affect does productivity have on the hen, farmer and consumer?

– amount of eggs laid by hen

– number of broken or lost eggs

– economic viability of egg farmers to make a living

– cost and quality for consumer

Review your list and mark a "P" beside the factors you feel had a positive impact for society (or pro technology) and an "N" beside the ones you feel had a negative impact for society (cons for technology).

After you have rated each item individually, evaluate whether the overall changes brought about by technology were positive or negative for society.

Suggest ways technology could be used to improve upon current egg industry practices.

THE IMPACT OF TECHNOLOGY

Factors for consideration and discussion.

HEALTH

Impact the changes in production practices have on the health of the hen, farmer, and consumer.

Pros

- *reduced exposure to dirt and bacteria has resulted in less disease in the flock*
- *reduced health risks to farmers and hens due to less dust and ammonia production*
- *reduced egg spoilage*
- *resulted in elimination of antibiotics in feed*
- *more balanced, nutritious diet for hen*
- *dramatically reduced the number of hens lost (decreased mortality rate)*

ENVIRONMENT

The effect of automation and technology on the physical and psychological well being of the farmer, hen and consumer.

Pros

- *temperature controlled environment protects the flock from weather extremes and more comfortable for farmer to work in*
- *hens are protected from predators*
- *better quality of air for hen and farmer*
- *less incidence of hen fighting*
- *cages significantly reduced injury and death to hens from piling up on top of one another when they are frightened*
- *less physical strain to farmer*
- *hens lay year-round providing consumers with a continual supply of fresh eggs*
- *less manure is produced per hen, as more nutritionally dense feed is more fully digested by the hens*
- *feed has more nutritional value, so less feed is required. This means less land is required to feed more people*
- *less likely to contract disease*

Cons

- *hens are not free to roam the barn or yard*
- *farmer requires more specialised knowledge of how to care for the hens*
- *initial set-up is more expensive for the farmer*
- *larger farm operations mean higher concentration of manure at each site and more effort is required to dispose of the waste properly*

PRODUCTIVITY

How technological changes affected productivity and their subsequent effect on the hen, the farmer and the consumer.

Pros

- *more eggs laid by hen*
- *fewer broken or lost eggs*
- *one worker can take care of more hens*
- *farmer can now make a living strictly from producing eggs*
- *steady egg prices for consumer*
- *less land is required to feed and house more hens*

Cons

- *capital cost to establish a farming operation has increased greatly*
- *farmer requires more mechanical skills*

EGG FACTS

LABOUR & PRODUCTION COSTS

Year	Hourly Farm Wage	Farmer's Average Price Per Doz.	# of Hens per full time staff person
1965	$1.00	0.35	2000
1995	$12.00	1.03	10,000 – 15,000

FEED EFFICIENCY

Year	Feed required per dozen eggs
1951	3.4 Kq
1991	1.6 Kg

CONSUMER PRICE INDEX (BASE YEAR 1986 = 100)

Year	All Items	Food	Eggs (per dozen)
1955	21.5	18.7	44.6
1965	25.7	22.6	39 .4
1975	44.2	44	61.3
1985	96	95.2	100.9
1986	100	100	100
1995	133.5	126.3	118

EGG PRODUCTION & FARMER'S PRICE

Year	Number of dozens of eggs produced	Farmer's average price per doz.
1951	223,900	$0.500
1956	338,856	$0.413
1961	373 061	$0.350
1966	374,896	$0.417
1971	448,002	$0.305
1976	419,301	$0.642
1981	453,275	$0.904
1986	425,500	$0.830
1991	414,617	$0.897
1995	420,508	$1.027

AVERAGE # OF EGGS LAID PER HEN

1955 – 160 a year

1995 – 282 a year

MANURE GENERATED TO PRODUCE ONE DOZEN EGGS

1951 – 7.14 Kg

1991 – 3.36 Kg

AVERAGE PERCENTAGE OF FLOCK LOST (MORTALITY RATE) DURING YEARLY PRODUCTION CYCLE

1955 – 50% to 70%

1995 – 4 ½% to 5%

CASE STUDY: PRODUCTION PAST & PRESENT

Jennifer was talking to her Grandfather during one of their family visits. Her Grandfather is an egg farmer. Jennifer told her Grandfather how they were studying the impact technology has had on various industries, and asked her Grandfather to tell her about his experience with technology in egg production. Here is their story.

"Well, technology certainly has changed the way I work," said her Grandfather. "I work just as many hours, but the work is not as physically hard and I'm a lot more productive.

"I can remember when it took hours just to find and collect all the eggs. I used to have 2,000 hens in the old barn. They would be running everywhere. Some went out in the yard, others just meandered in the barn. A lot of the hens would lay their eggs over in the far side of the barn, the rest were all over the place. Collecting eggs was like a game of hide and seek. Now the eggs roll automatically onto the collection belt. I usually run the belt twice a day. I can collect eggs from 10,000 birds in the same amount of time it took me to collect eggs from my 2,000 hens, when I did it by hand.

"The other big difference is the barn itself and all these control systems. Since I had this new barn built and installed the ventilation system I never lose hens to overheating or cold. And look at this control unit. It automatically adjusts the fans, heaters and lighting so the hens are comfortable no matter what the outside weather conditions are like. Not to mention it's far more comfortable for an old guy like me.

"Yes, I'd say technology has made a difference. I even remember the first time your Dad's cousin Sam came to the farm. Ha! I'll never forget the look on his face when we brought him into the barn. 'What's that stink?' he asked. The barn sure had a real ammonia smell to it. Between the smell and the dust from the dirt floors, the air could get pretty bad sometimes. I know lots of fellows who developed lung problems. I'm sure all that dust in the air had something to do with it.

"The ammonia was hard on the hens as well, especially their eyes. Between the changes in barn construction and the use of cages for hens, we have a lot healthier environment for the hens and for ourselves.

"By moving hens into cages, it meant the floors could be made of concrete, eliminating the dust problems and allowing us to put heaters in. When you had all that straw and dirt around you couldn't have heaters. The chance of fire was too great.

"Using cages also meant antibiotics could be eliminated from the feed. When the hens were on the floor, they would walk in and eat their own manure, and that led to a lot of disease problems. With the cages raised off the floor, manure automatically drops down into these pits. In fact, there is a newer cage system that has a belt that runs under the cage and catches the manure. Air flow is directed into the top of the cage and down onto the belts. The air then dries out the manure, and that keeps the birds more comfortable by eliminating the ammonia build-up.

"The other nice thing about the new belt system is that the conveyor belts empty out behind the barn and that makes it a lot easier to keep the barn clean. It makes it easier to manage the composting of the manure as well. I heard that some folks are selling the manure to compost operations."

"It seems kind of cruel to have the hens stuck in those cages," said Jennifer.

"At first I wasn't so sure about these cages myself," replied her Grandfather. "But you know, I started to think about how many hens I lost every year because of the hens piling up on top of one another, or because the stronger hens attacked the weak ones, and then it seemed like a reasonable trade-off. In fact, there is a lot of research being conducted to evaluate different housing systems and their affect on the well-being of hens. You should call your Aunt Kathy. She runs a floor system for her hens; she can tell you about it and then you can decide on what system you think is best."

"Why do the hens attack the weak ones?" asked Jennifer.

"It's a natural behaviour for many birds," explained her Grandfather. "They tend to pick on the weak, in order to keep the group strong. Sometimes the weak ones die because the other hens won't let them eat, and other times they are actually pecked to death. Beak trimming helps to reduce injury from pecking. The sharp end of the beak is clipped when the bird is still a chick. Besides,with the cage system, we don't see the same number of problems. The cage system helps us identify problems more quickly and treat or control them. Hen health has really improved with the cages."

"Why would you say that?" asked Jennifer.

"Well, we no longer need to use antibiotics in our feed and we rarely have a sick hen," answered her Grandfather. "Everything is cleaner, you can regulate the feed and water to ensure the hen gets all the nutrients it needs. Hens won't lay eggs if they are upset or sick and we sure get a lot more eggs from each hen than we used to."

"Are there new housing systems being developed?" asked Jennifer.

"Yes," her Grandfather replied. "In fact, egg farmers help to fund research on hen housing. I know of a project that is testing cages that have perches and nesting boxes. And there are a number of new cage designs being produced that are larger and have fewer crossbars.

"It's never easy finding just the right mix for safety, comfort and affordability, but I think we are on the right track."

Jennifer decided to give her Aunt Kathy a call to find out more about her "floor" operation. Jennifer told her Aunt about her conversations with her Grandfather and how he had suggested that she could help Jennifer learn about floor or free-range operations.

"The big difference with "free-range" operations is that the hens are not in cages," explained Aunt Kathy. "For the most part hens don't actually roam the range but are kept in a barn (hen house), where the hens are free to move about and interact with one another. I have 300 hens in my operation," she explained.

"What is the advantage of a floor system?" asked Jennifer.

"Well, the main advantage is that the hens have more space to move around in, which seems more natural to me," stated her Aunt.

"Grandfather has 10,000 hens. Could you house 10,000 hens on the floor?" asked Jennifer.

"No. Generally floor operations are for smaller flocks of 300 to 400, as hens tend to naturally bunch together, so they might end up hurting one another if the group was too large," explained Aunt Kathy.

"Why don't more farmers use floor operations? They could save money by not buying cages," noted Jennifer.

"Yes. That's true, but a floor system takes a lot more work hours to maintain. One person can only look after smaller flocks, which means you have fewer eggs. You also lose more eggs, as some get lost or trampled on and others get too dirty which might lead to contamination. Fewer eggs to sell means you earn less money. It's not the easiest way to make a living," said her Aunt.

"How come it's more work?" asked Jennifer.

"When you have a floor operation, most of your work is done by hand, which means it takes more time to collect the eggs, distribute feed and water, and remove manure. You also have to monitor the birds more closely to make sure the stronger ones are not picking on the weaker ones, as hens do get aggressive at times," she added.

"I was wondering," said Jennifer, "are the hens healthier when they are kept on the floor or in cages?"

"That's a good question but not an easy one to answer." Her Aunt went on to explain. "There are pros and cons to each system. Scientific evidence shows that both systems produce nutritionally healthy birds. Mortality rates, however, are quite a bit higher for floor operations. When the flock is free to interact with one another, disease can spread quickly if it isn't detected and treated right away. Many floor operators will regularly add antibiotics to the feed to prevent and control the spread of disease. At the same time, the floor operation provides greater freedom of movement and social interaction between hens. So you see it's not a simple yes/no answer.

"Actually, there is a lot of research going on to find a system that provides the best of both worlds. Maybe your class could design a new system," suggested her Aunt.

"That's a great idea. I'm going to suggest that for our class project," stated Jennifer.

YOUR OPINION IS IMPORTANT TO US

We are interested in learning about your experience in using the **TECHNOLOGY & EGG PRODUCTION** teaching module.

How did you hear about the module? Check all those which apply –

- ❑ Received Educating Egg Resource Guide and order form in the mail
- ❑ Received information at a Teacher's Convention or workshop
- ❑ Received information while at a farm or consumer exhibit
- ❑ Received information through Agriculture in the Classroom
- ❑ Materials were recommended by a colleague

Please list other sources _____

How did you use the materials?

Grade(s): _____

Subject or Curriculum area: _____

If applicable, how did you modify or adapt any of the materials? _____

If applicable, how did you supplement the module? _____

What were your teaching objectives for using this material? _____

_____

	unsuccessfully				successfully
Module helped to meet objectives?	1	2	3	4	5

Please comment: _____

_____

The module lists the following learner expectations.

Students will

- Identify changes in egg production practices due to technology and automation
- Identify and compare historical farming practices versus modern commercial production
- Evaluate the impact of technological changes on the quality of life for the hen, the farmer and the consumer

	very appropriate				not appropriate
Were the learning expectations appropriate?	1	2	3	4	5

What do you consider to be the key learning or messages from this module? _____

_____

How were the materials received by students?	poorly				extremely well received
How Egg Production Has Changed (case study)	1	2	3	4	5
The Eggstraordinary Egg (brochure)	1	2	3	4	5
The Eggstraordinary Egg (video)	1	2	3	4	5

Did the module:	**unsuccessfully**				**successfully**
Provide new information?	1	2	3	4	5
Provide new learning?	1	2	3	4	5
Reinforce previous knowledge?	1	2	3	4	5

Were there any controversial issues brought forward as a result of using this module? _____

_____

What were the issues? _____

Was there sufficient information and support materials in the module to handle the issue?

❑ **Yes** ❑ **No** ❑ **Partially**

If no, what would be sufficient to address this issue? _____

_____

_____

Which part(s) of the module will you continue to use? Check all that apply –

- ❑ Lesson A: How Egg Production has Changed
- ❑ Lesson B: The Impact of Technology
- ❑ Student worksheet/Teacher worksheet: How Egg Production Has Changed
- ❑ Case study: Production Past and Present
- ❑ Brochure: The Extraordinary Egg
- ❑ Video: The Extraordinary Egg

Would you recommend this module to other teachers? ❑ **Yes** ❑ **No**

In producing these resource materials The Canadian Egg Marketing Agency has the following objectives. In your opinion did the materials meet these objectives:

	failed to meet				**met objective entirely**
Provide materials which assist students to learn about how eggs are produced and marketed	1	2	3	4	5
Develop positive attitudes towards eggs	1	2	3	4	5
Provide materials which support curriculum objectives	1	2	3	4	5
Provide materials which are credible	1	2	3	4	5
Provide materials which are accurate	1	2	3	4	5
Provide materials which are of excellent quality	1	2	3	4	5

Please return to: Canadian Egg Marketing Agency

Fax: (613) 238-1967