EASTER BUSH SCIENCE OUTREACH CENTRE

Get hands-on with real-life science

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Farm Detectives

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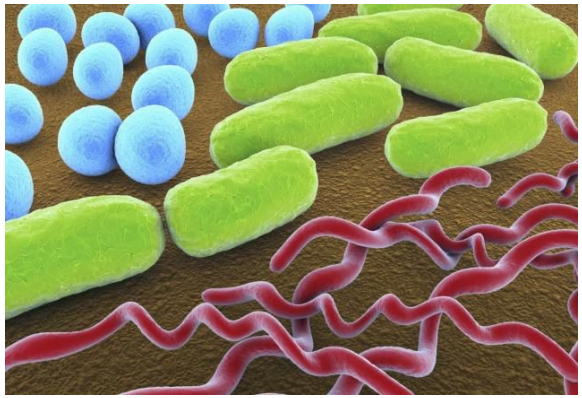
What are microorganisms?

microorganism

tiny

a living thing



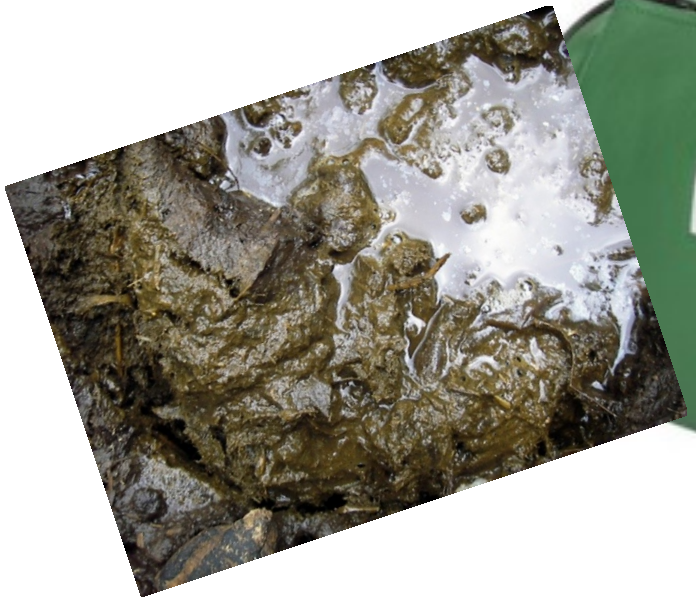
Bacteria

Fungi

Viruses

There's trouble on the farm!

Call the vet!



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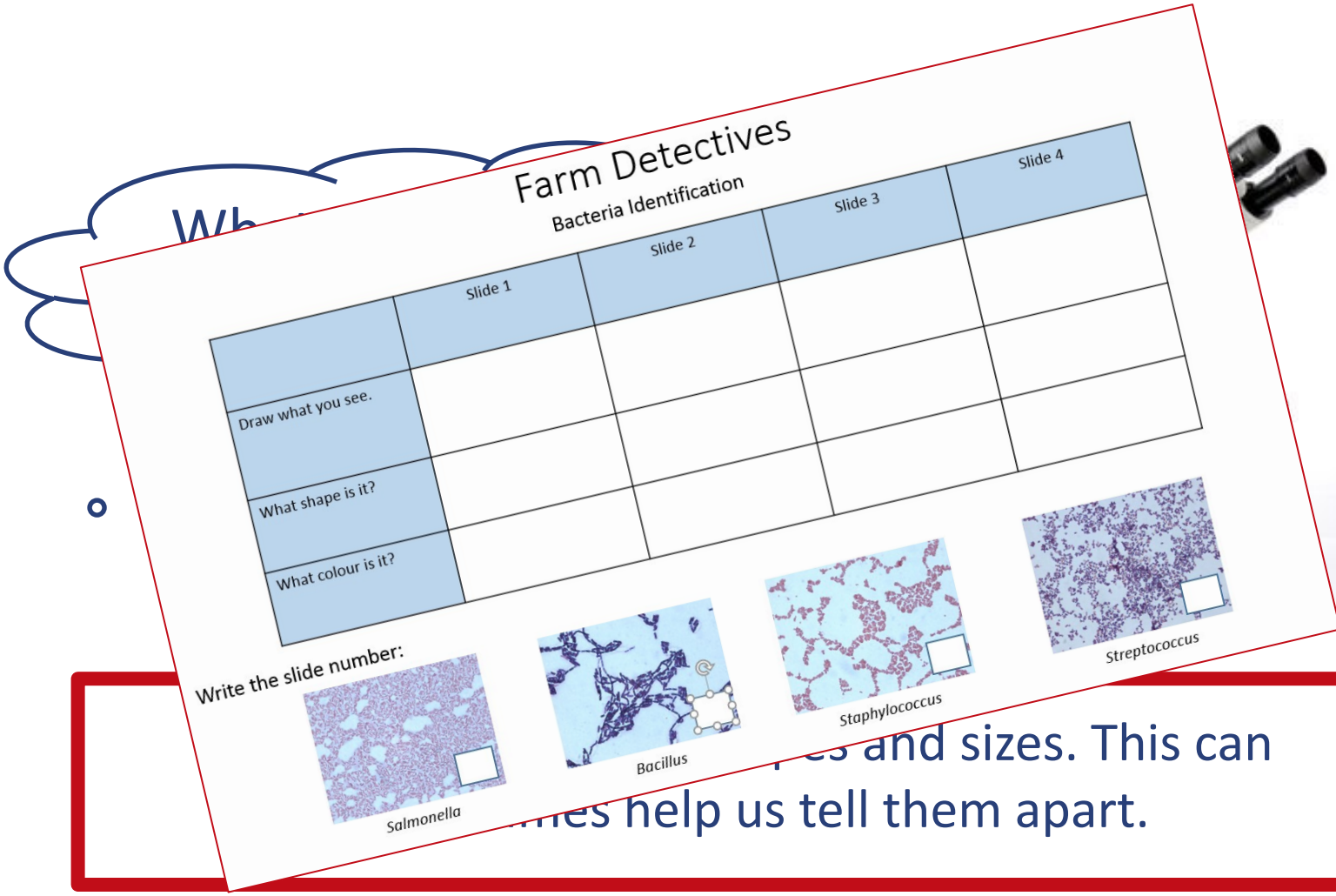
Bacteria Culture

We will grow the bacteria for a few hours at

We need your help!

- What caused the illness?

Bacteria Identification



...es and sizes. This can
...mes help us tell them apart.

Bacteria Identification

Match the what you see down microscope with the pictures.

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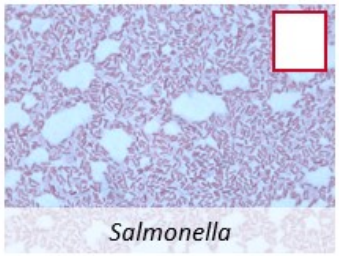
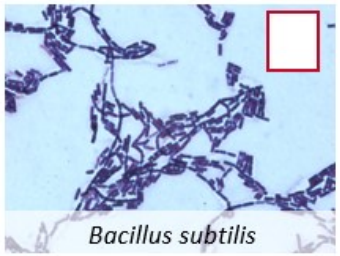
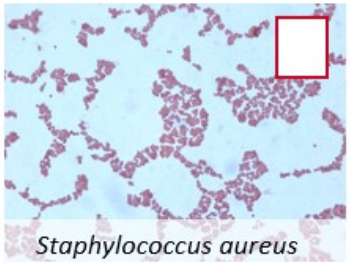
Can you identify the bacteria on each slide?

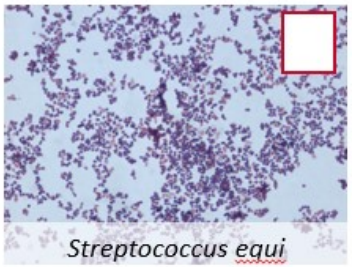
	Slide 1	Slide 2	Slide 3	Slide 4
Draw what you see				
What shape is it?				
Is it Gram positive or Gram negative?				

Write the number of slide that matches the picture:


Salmonella


Bacillus subtilis


Staphylococcus aureus


Streptococcus equi

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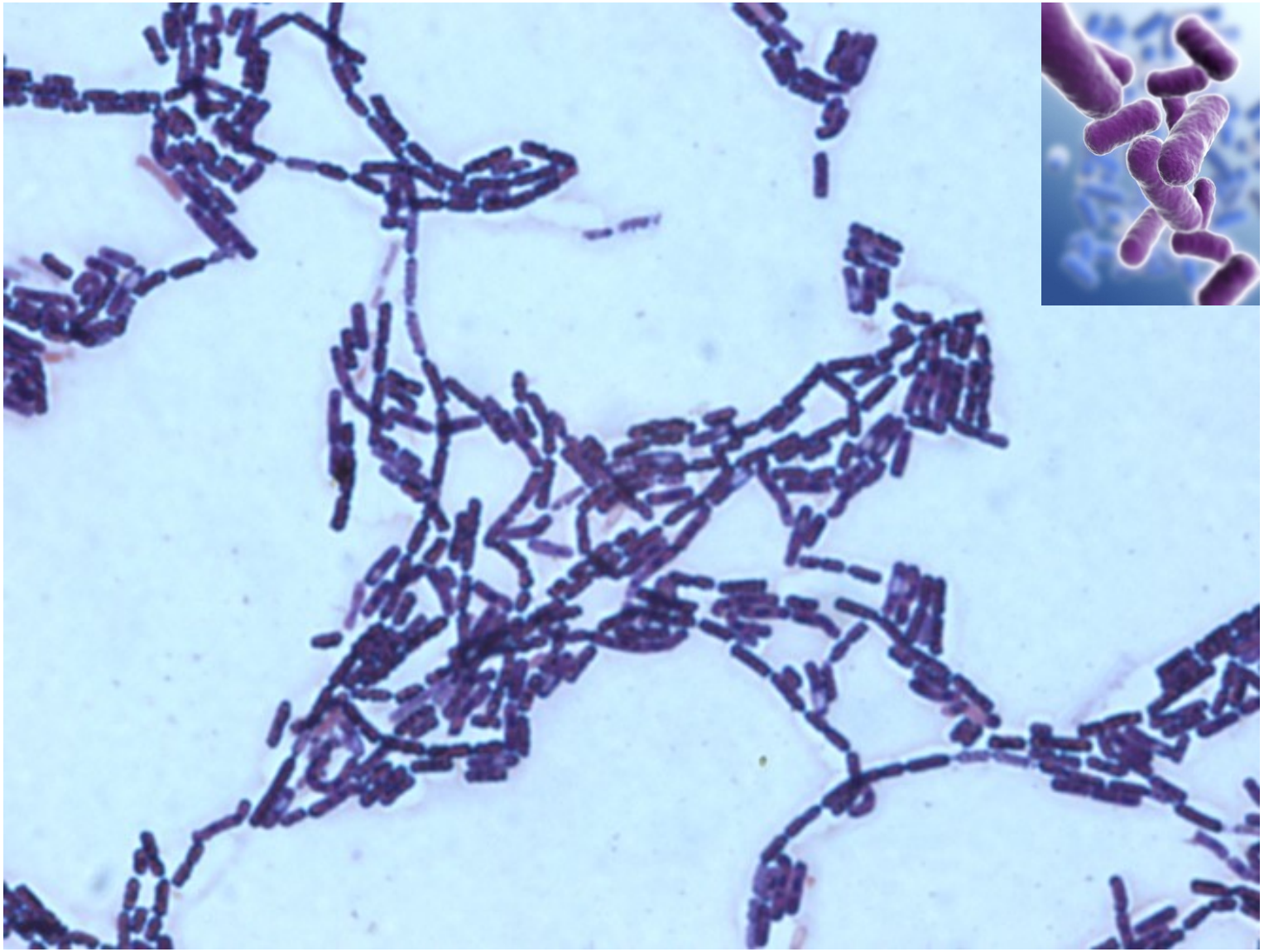
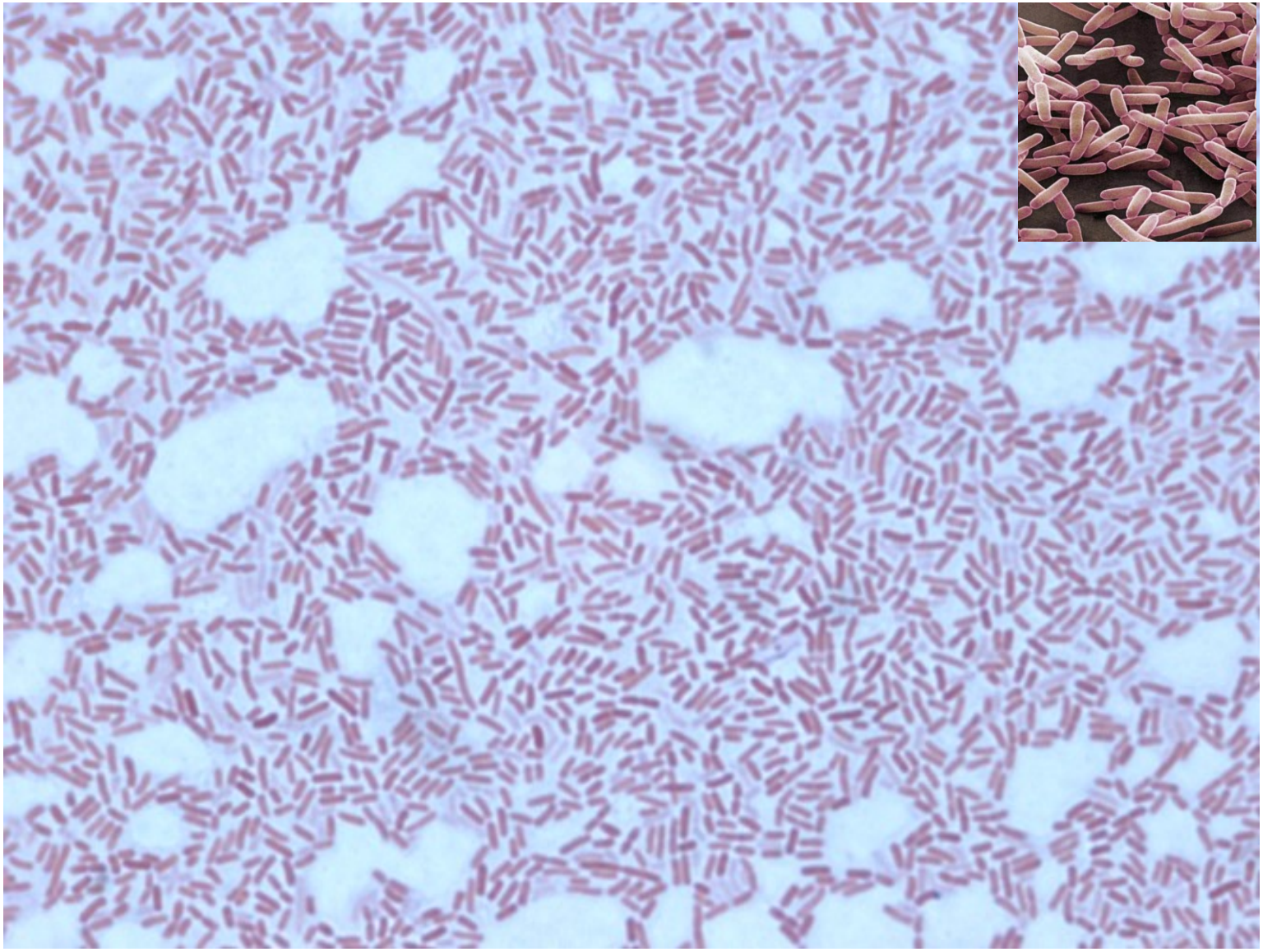
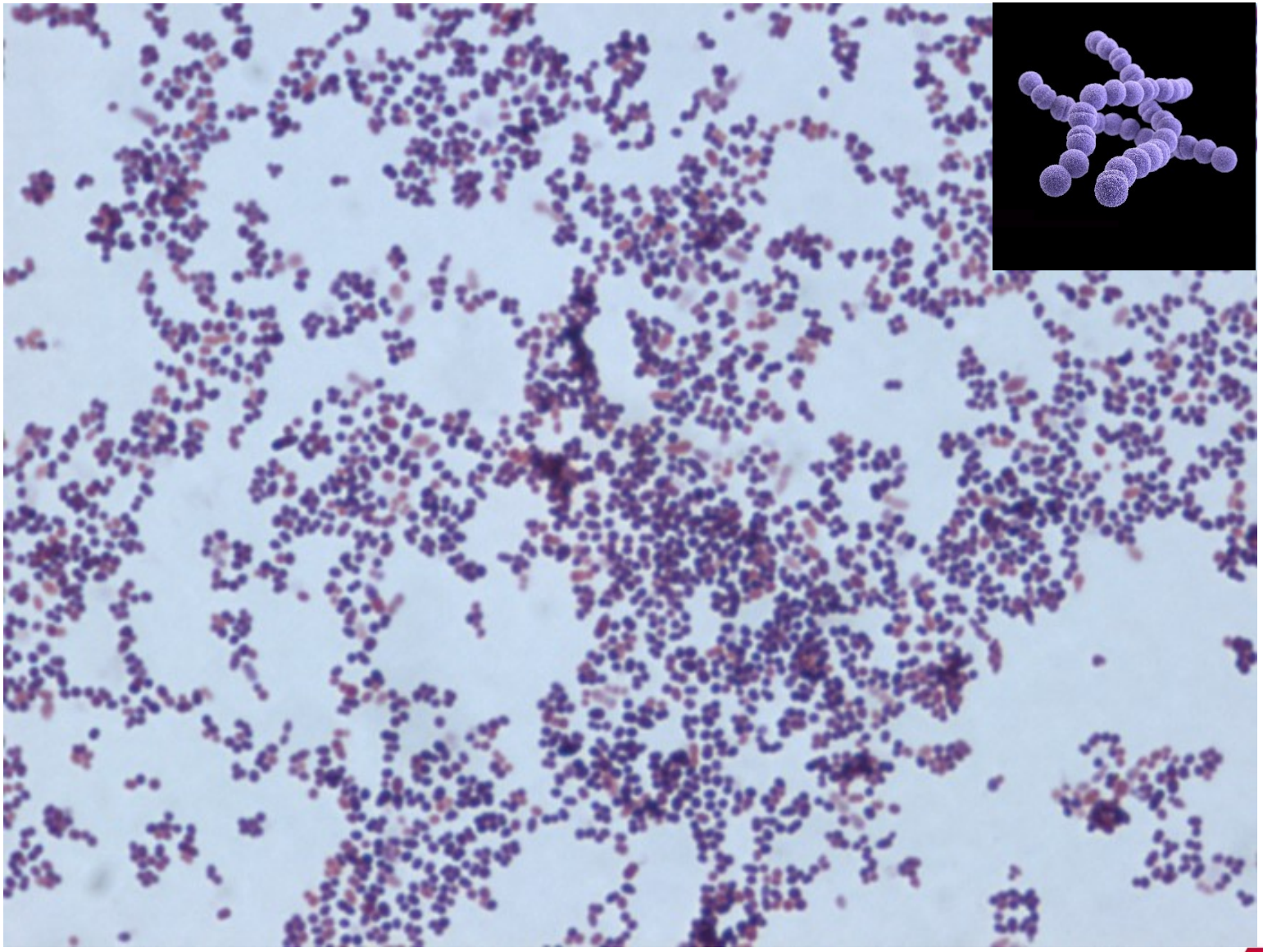
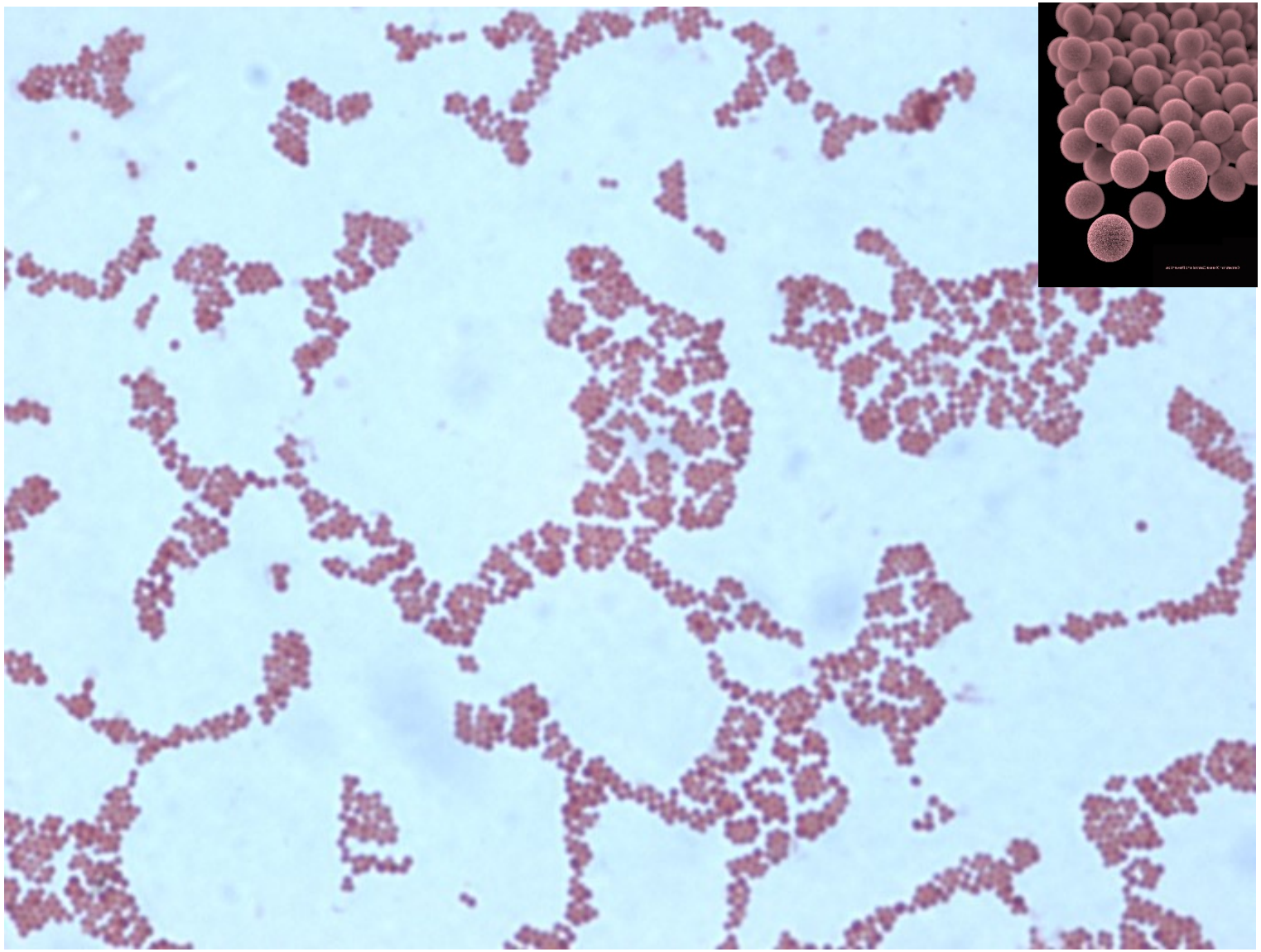
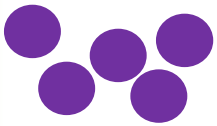
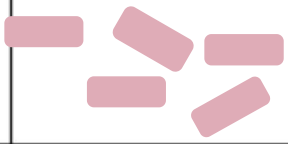
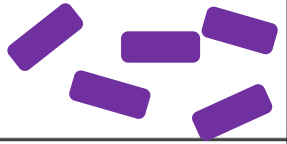




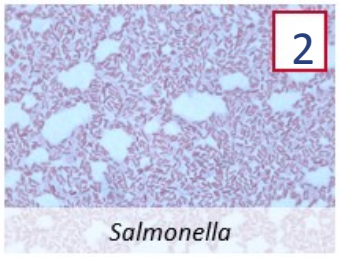


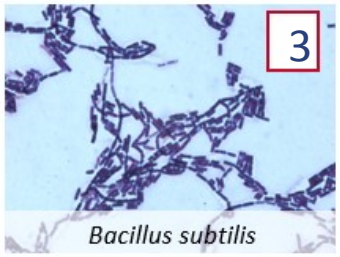


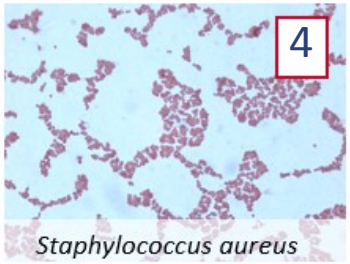
Did you identify the bacteria?

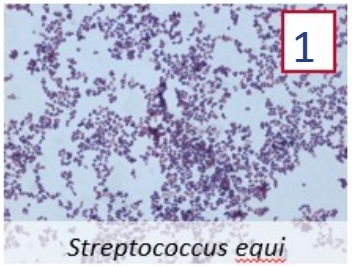
	Slide 1	Slide 2	Slide 3	Slide 4
Draw what you see				
What shape is it?	cocci	rod	rod	cocci
Is it Gram positive or Gram negative?	positive	negative	positive	negative

Write the number of slide that matches the picture:









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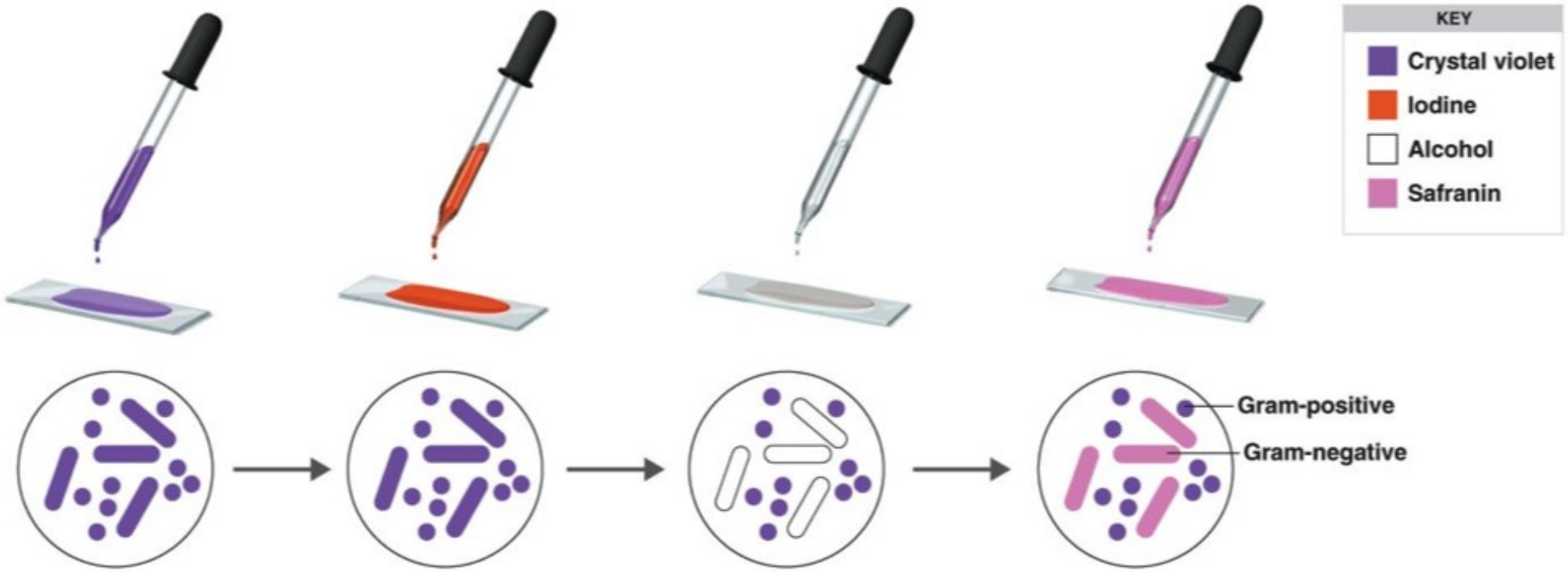
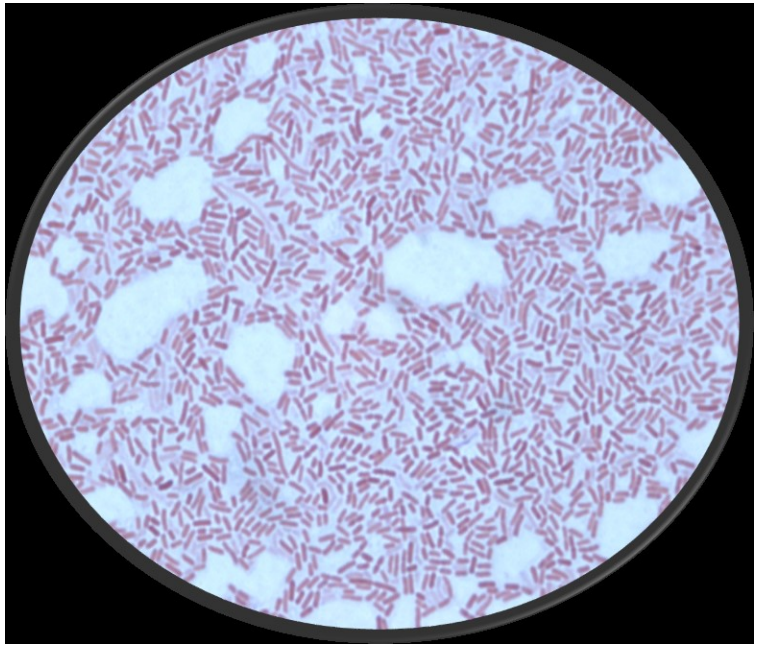
Why were they pink and purple?



Gram staining is a technique scientists use to identify different bacteria.

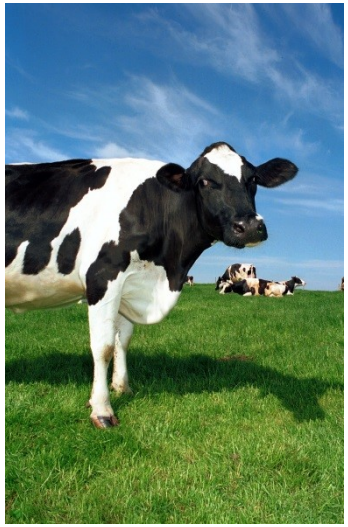
What caused our cow's illness?

Bacteria on slide 2 came from our sick cows.

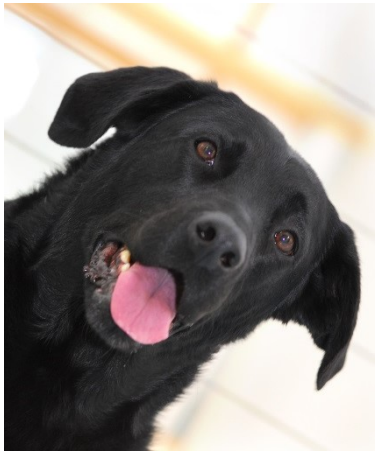


The diagnosis

- Salmonellosis
- Caused by *Salmonella* bacteria
- Infects:



and humans!



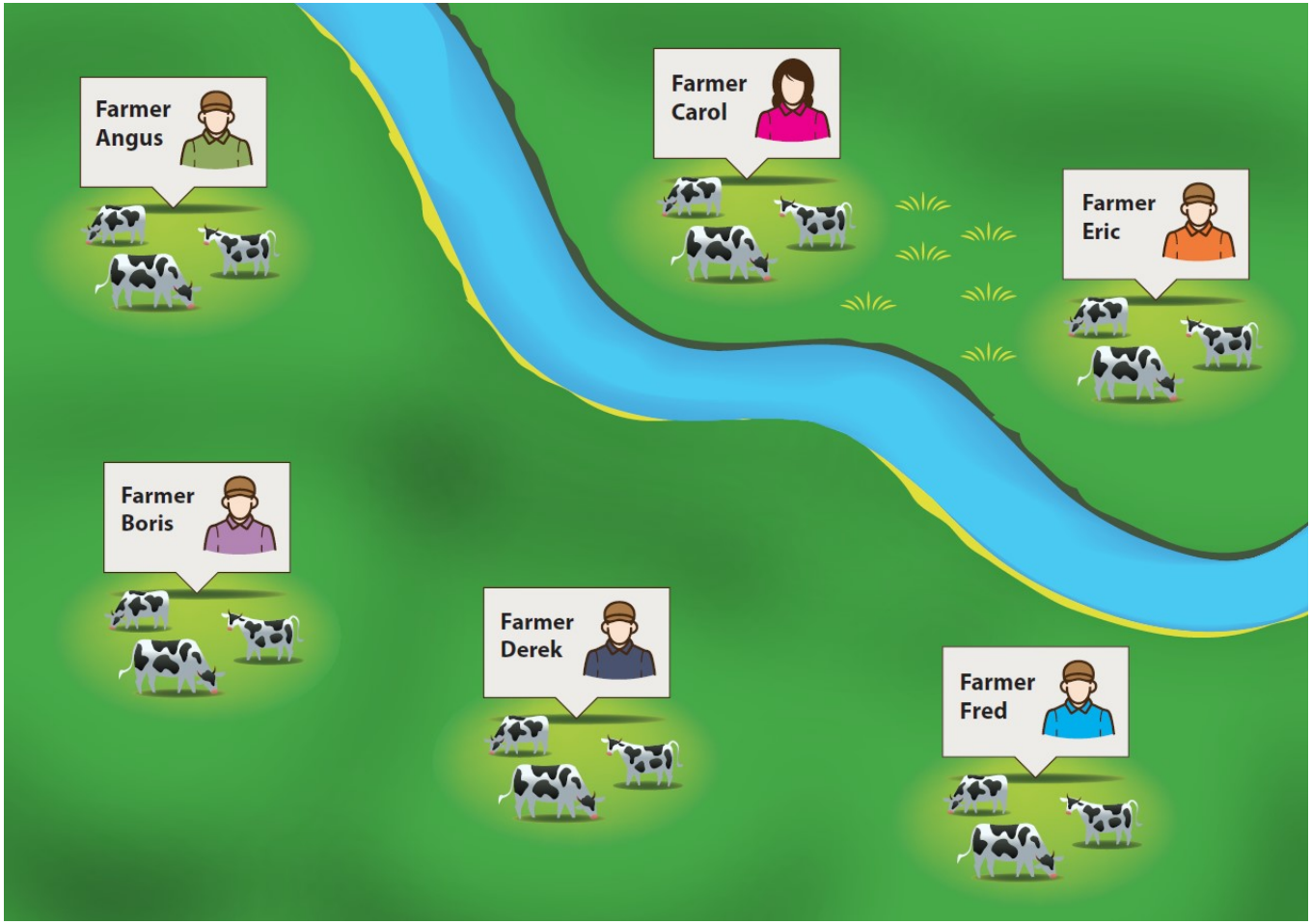
We need your help!

- What caused the illness?

- Where did it come from?
- How did it spread?

Track the Disease Spread

Farms and Farmers



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Public Health Investigators

Where did the disease come from?

COWS-4-LESS

THE HAPPY HEIFER CATTLE DEALERSHIP

Caledonian Cattle Company

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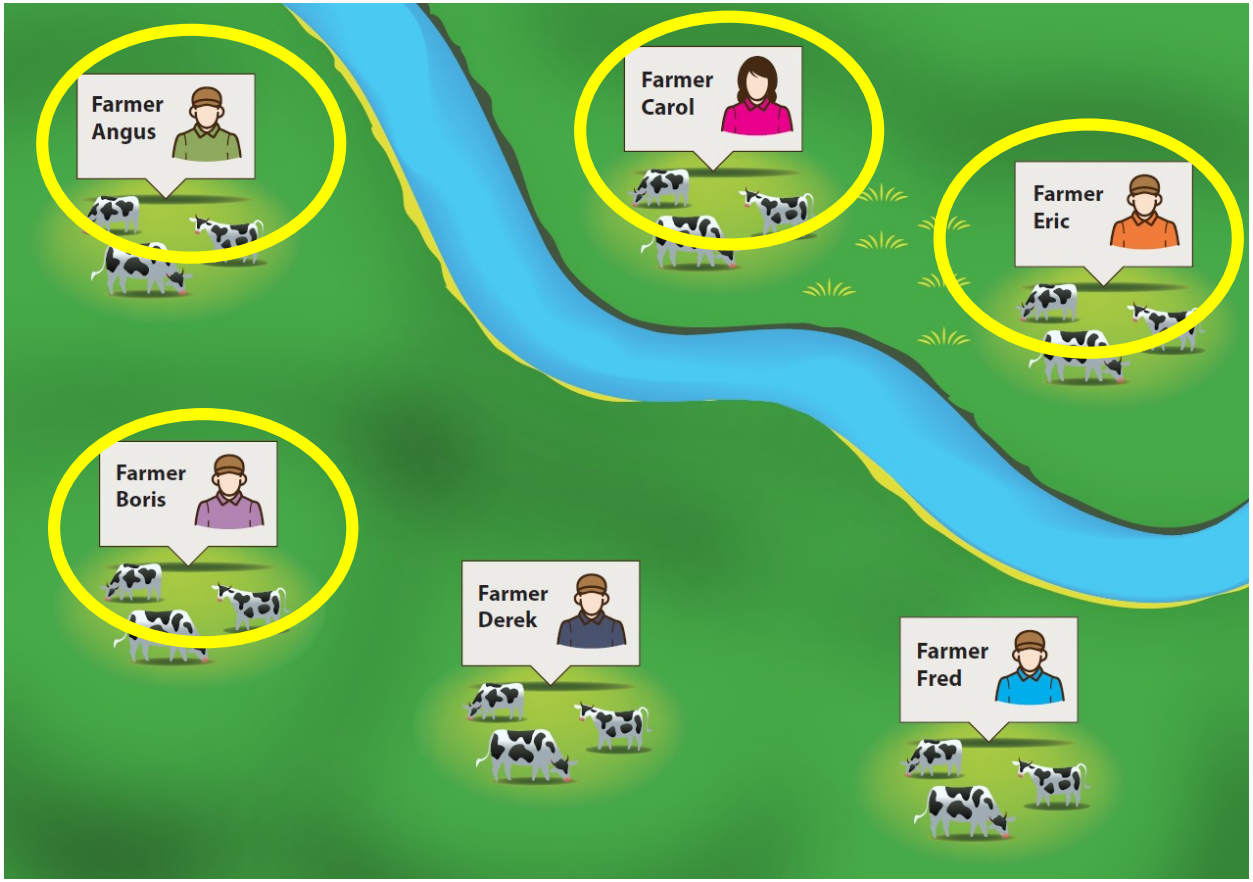
Which farmers have sick cows?



Use the farmers to help you.

I buy all my dairy cattle from Cows-4-Less, because they have the best prices, and I've never had any problems before. But now my cows are infected with a disease!

Farmer Angus

Place the action cards on the map!

COWS-4-LESS

THE HAPPY HEIFER CATTLE DEALERSHIP

Caledonian Cattle Company

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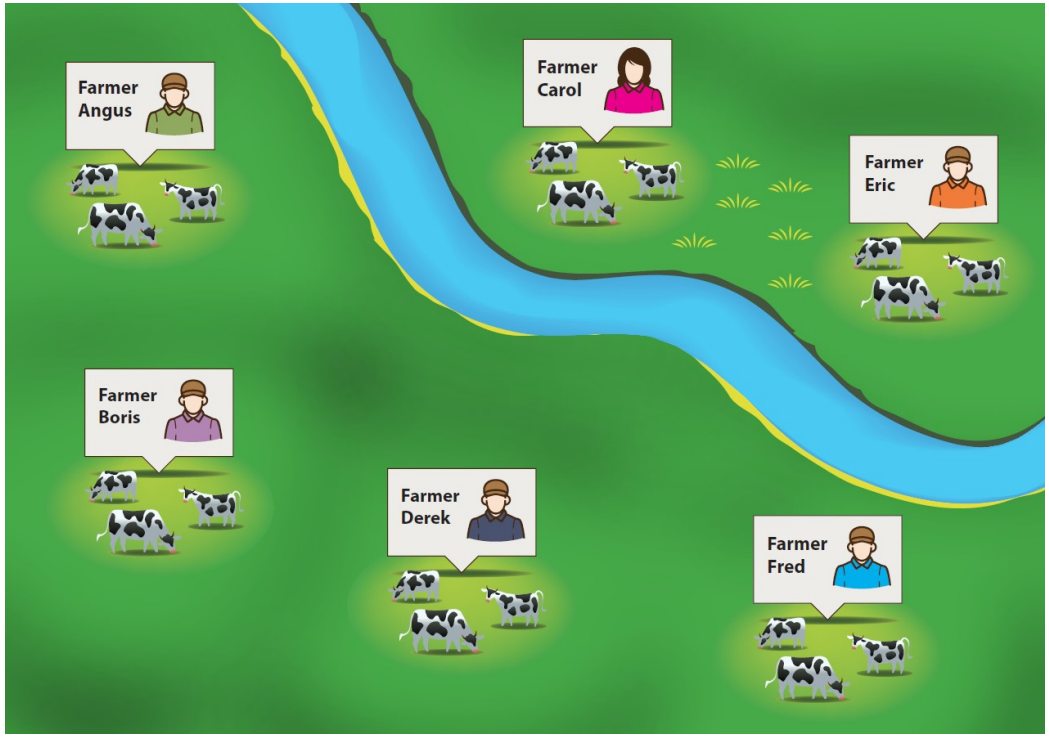
Where did the disease come from?



Use the clue cards to help you:

Heavy rainfall has caused the river to flood some of the cow's grazing fields.

Some bacteria which cause illness can be found in raw meat. Cooking meat properly kills bacteria, however, making the food safe to eat.

Where did the disease come from?

It came from Cows-4-Less.

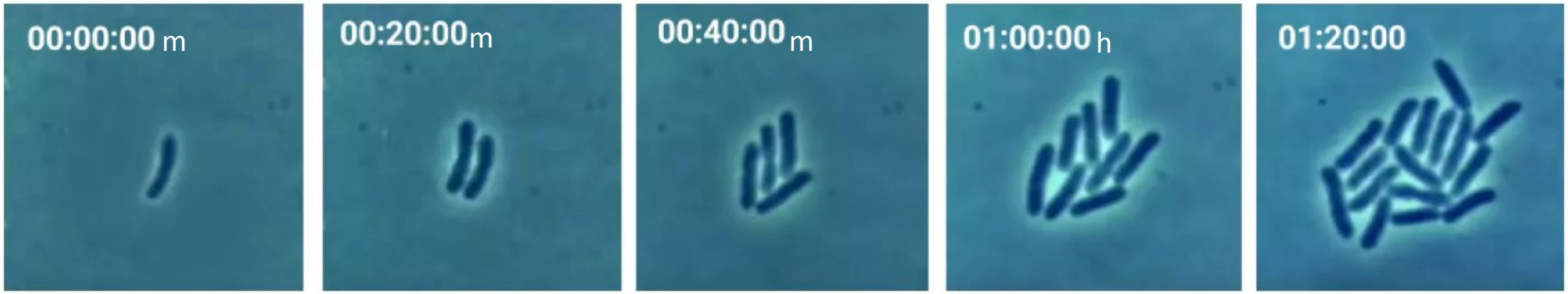
How did it spread?

It spread to Farmer Eric's cows in the flood water.

How do bacteria grow and reproduce?

It reproduces by splitting in half.

How fast to bacteria reproduce?



It reproduces every 20 minutes.

Can you work out how many there will be?

You will need

Time Passed (minutes)	Number of Bacteria
0	1
20	2
40	4
60	8
80	16
100	32

Short break

Remove your gloves and lab coat if leaving the lab.

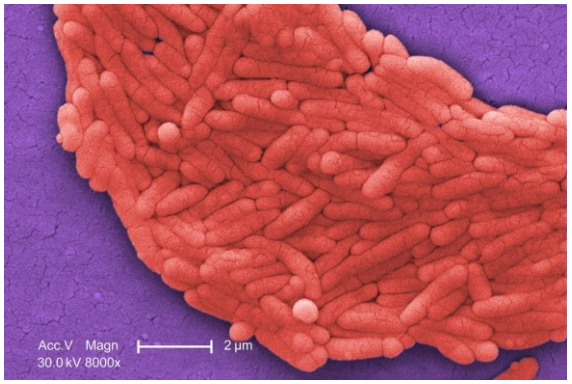
Safety first!

We need your help!

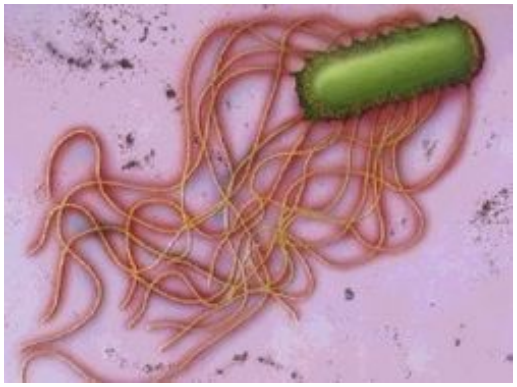
- What caused the illness?
- Where did it come from?
- How did it spread?
- What type of *Salmonella* is it?

Are all *salmonella* bacteria the same?

Salmonella typhi



Salmonella gallinarium



Salmonella dublin

Salmonella typhimurium

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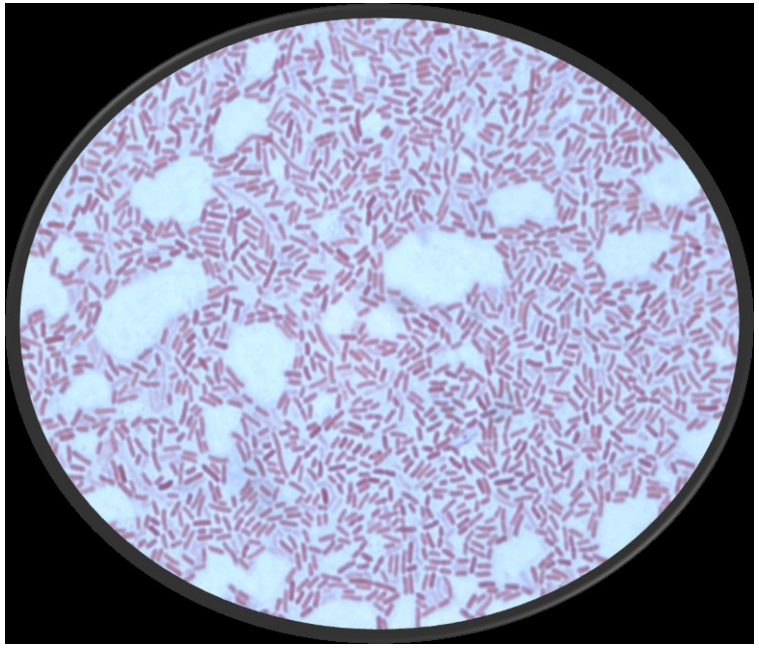
Which type of *salmonella* do our cows have?

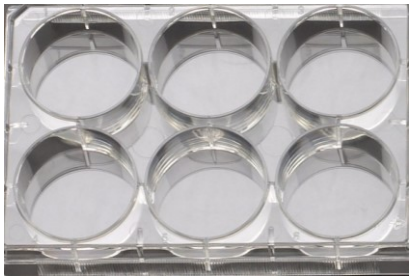


Salmonella

Agglutination (stick-together) test

You will need:

4 tubes of liquid



1 plate

1 tube of bacteria from a sick cow

1 pipette

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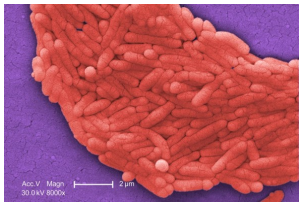
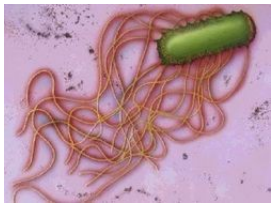
How does the test work?

Test liquids

Salmonella typhi

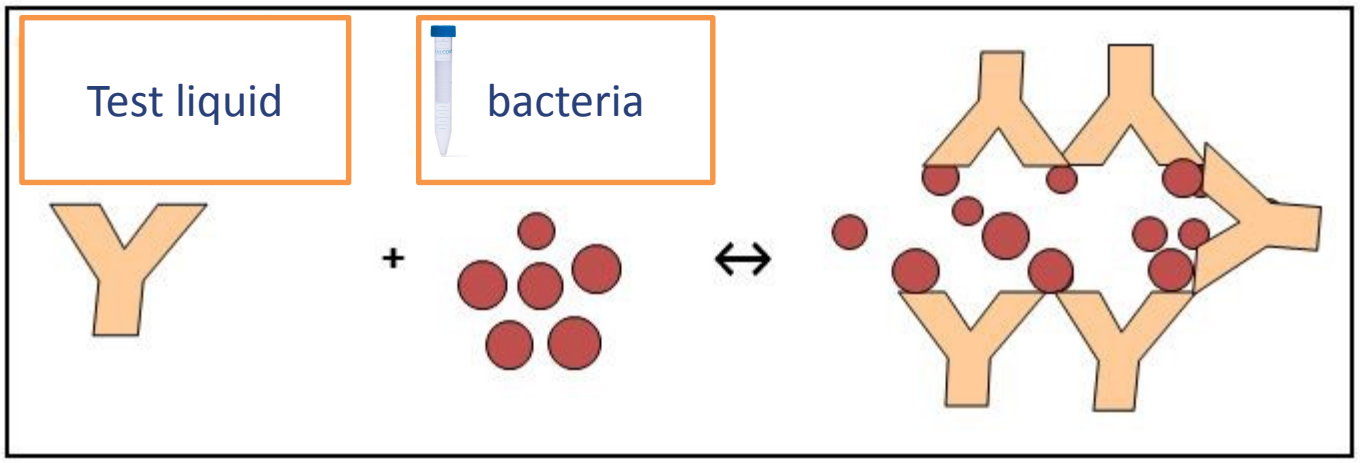


Salmonella gallinarium



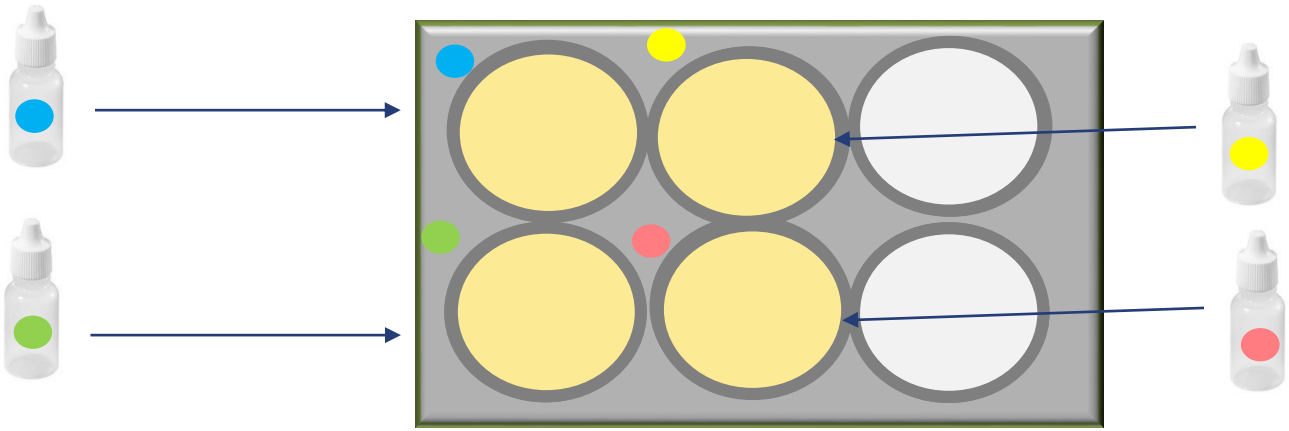
Salmonella dublin

Salmonella typhimurium



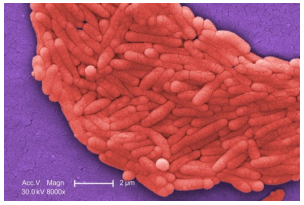
Agglutination (gloopy) test

2) Put 5 drops of each liquid into one well.

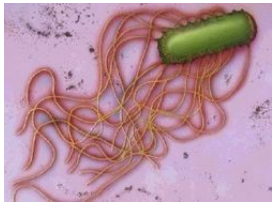


Which test liquid made the bacteria clumpy?

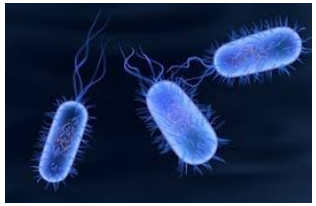
Salmonella typhi



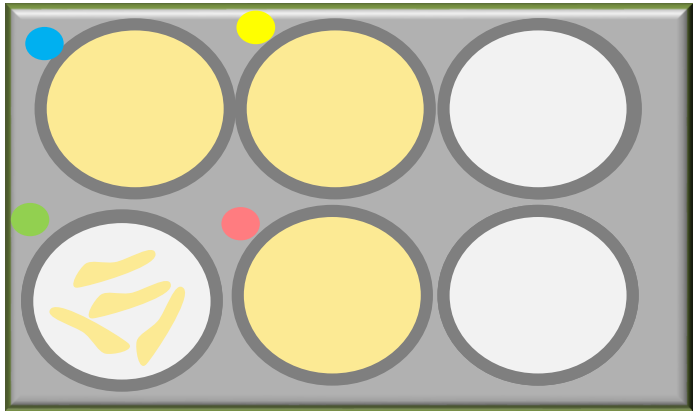
Salmonella gallinarium



Salmonella dublin



Salmonella typhimurium



Which type of *salmonella* do our cows have?

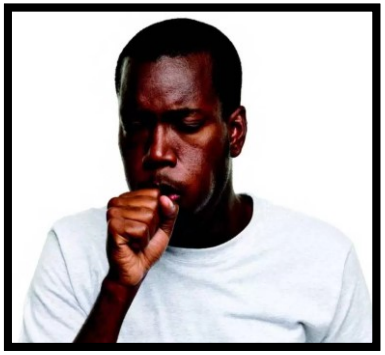
The agglutination test shows our sick cows have got..

Salmonella dublin

We need your help!

- What caused the illness?
- Where did it come from?
- How did it spread?
- What type of *Salmonella* is it?
- What can we do to stop the disease from spreading?

How do bacteria spread?





Is this direct or indirect contact with the bacteria?

LUNCH

Meet the Scientists

We need your help!

- What caused the illness?
- Where did it come from?
- How did it spread?
- What type of *Salmonella* is it?
- What can we do to stop the disease from spreading?

Have you been contaminated?

Did you touch the giant bacteria?

What do you need to do to get rid of the bacteria on your hands?

But first!!! Make a prediction!

1) Apply 1 pump of GLO GEL to your hands and gently rub them together.

2) Look under the UV light.

3) Each person in your group now washes their hands in a different way:

Person 1	Wash your hands with water.
Person 2	Wash your hands with soap and water.
Person 3	Wipe your hands with a baby wipe.
Person 4	Wipe your hands with dry tissue.

We need your help!

- What caused the illness?
- Where did it come from?
- How did it spread?
- What type of *Salmonella* is it?
- What can we do to stop the disease from spreading?





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Can you control disease spreading?

Read the statements then put them in pile …

Agree

Disagree

What we do!

THE UNIVERSITY of EDINBURGH
The Royal (Dick) School of Veterinary Studies

ROSLIN

Thank You
Farm Detectives

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What did you think?

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