

GCSE Biology B (Twenty First Century Science)
J257/03 Breadth in Biology (Higher)

Question Set 18

1 Adult female cows have an oestrus cycle.

(a) The hormones that control the oestrus cycle are the same as those that control the human menstrual cycle.

Which hormone is responsible for the release of an egg when a cow ovulates?

Tick (✓) **one** box.

- | | |
|--------------|-------------------------------------|
| FSH | <input type="checkbox"/> |
| LH | <input checked="" type="checkbox"/> |
| Oestrogen | <input type="checkbox"/> |
| Progesterone | <input type="checkbox"/> |

[1]

(b) The graph in **Fig. 10.1** shows the levels of some of the hormones during the oestrus cycle in one cow.

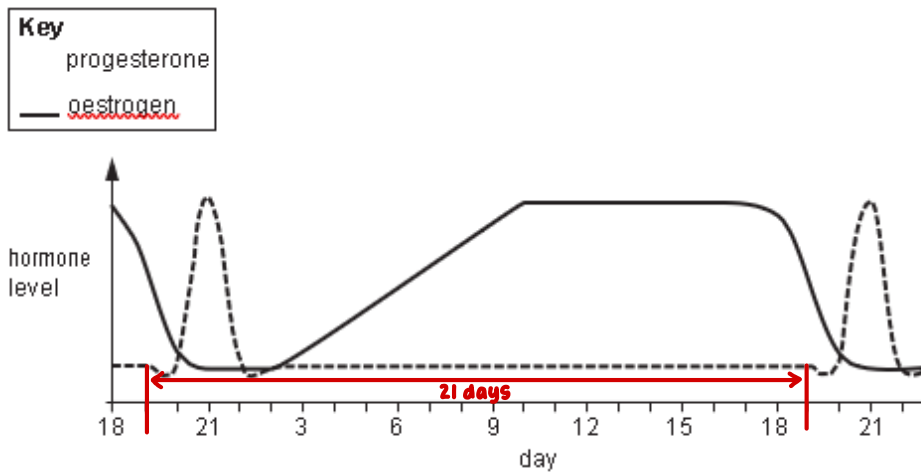


Fig 10.1

(i) Use the graph in **Fig. 10.1** to work out the length of one cycle.

Length of one cycle =**21**.....days [1]

(ii) The cow is **not** pregnant.

What evidence from the graph in **Fig. 10.1** supports this statement?

Tick (✓) **one** box.

The oestrogen levels rise and fall.

The progesterone levels are high for a period of time.

The progesterone levels fall.

There is no FSH shown on the graph.

[1]

(c) Cows are farmed to produce milk.

Each cow produces a different amount of milk.

(i) How could a farmer use selective breeding to try to make sure the cows in the next generation make a lot of milk?

Farmer should select parent cows that produce the highest yield of milk. The parent cows should be bred together. The resultant offspring will produce greater yields of milk. [2]

(ii) Farmers can carry out selective breeding artificially. To do this they need to manipulate a cow's oestrus cycle by injecting hormones.

Which hormone would a farmer inject to cause a large number of follicles to be produced?

Tick (✓) **one** box.

FSH

LH

Oestrogen

Progesterone

[1]

(iii) The farmers will collect the eggs from the cow and fertilise them with sperm from a bull.

A fertilised egg (zygote) divides to form an embryo.

What name is given to this type of cell division?

[1]

Mitosis

- (d) The embryos continue to develop.

When the embryo has 8 cells the cells are separated and allowed to develop into several embryos.

Each embryo is then transferred into a surrogate cow as shown in Fig. 10.2.

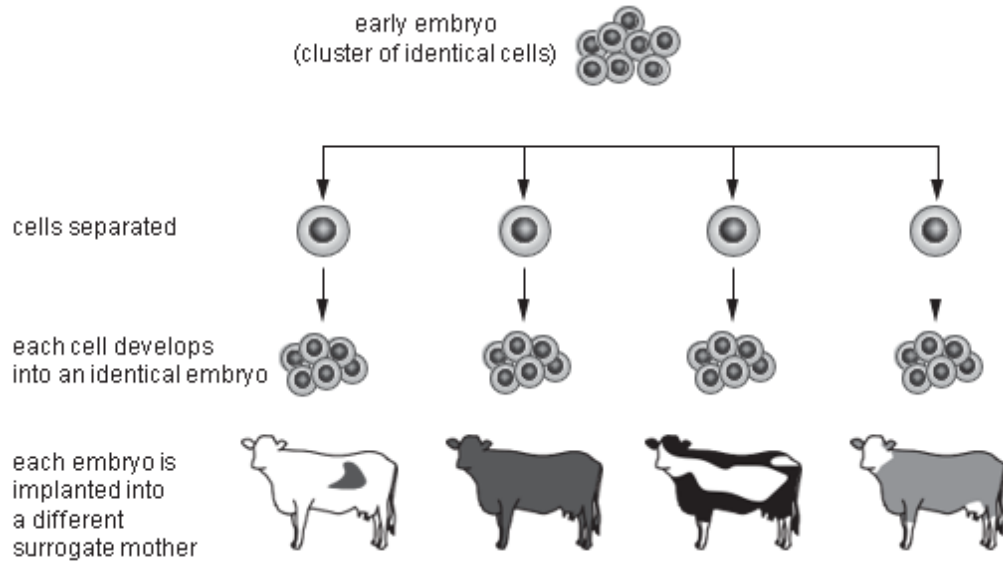


Fig 10.2

- (i) Suggest why a farmer may use this technique rather than allowing the cows to reproduce naturally. [2]

It permits the breeding of female cows to occur faster and easier as they do not need to mate. The splitting up of the embryo enables a greater number of offspring to be produced from parents with the desired characteristics.

- (ii) Why are the embryos split at this early stage rather than at a later stage? [1]

At the early stage, embryonic stem cells are still unspecialised so can divide and differentiate to form a whole organism. Beyond the eight cell stage they begin to differentiate and become specialised.

- (iii) Before the embryo is implanted into a surrogate cow, the cow will need to be given a hormone to allow the pregnancy to continue.

Name this hormone and explain why this hormone is required.

Progesterone maintain the uterus lining, enabling zygote implantation.

Total Marks for Question Set 18: 12

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