Topic 7: Animal Coordination, Control & Homeostasis

Edexcel · GCSE Biology · Revision Notes

Specification reference: 7.1–7.9

Note: Sections marked ★ HIGHER TIER ONLY are for Higher tier students only. Foundation tier students should focus on the unmarked sections.

7.1–7.3 The Endocrine System

The endocrine system uses hormones — chemical messengers transported in the blood from endocrine glands to target organs. It acts more slowly than the nervous system but has longer-lasting effects.

- Pituitary gland — releases TSH, FSH, LH, ADH and growth hormone.
- Thyroid — thyroxine controls metabolic rate.
- Pancreas — insulin and glucagon control blood glucose.
- Adrenal glands — adrenaline for fight or flight.
- Ovaries — oestrogen and progesterone.
- Testes — testosterone.

7.4–7.5 Blood Glucose Control and Diabetes

Blood glucose is controlled by negative feedback using insulin and glucagon from the pancreas.

- High glucose → insulin released → glucose taken into cells; excess converted to glycogen (liver). Glucose level falls.
- Low glucose → glucagon released → glycogen converted back to glucose. Glucose level rises.
- **Type 1 diabetes**: autoimmune — beta cells destroyed. No insulin produced. Treated with insulin injections.
- **Type 2 diabetes**: cells become resistant to insulin. Linked to obesity. Managed with diet, exercise, medication.

Exam Tip: Negative feedback means the response OPPOSES the change — it brings things back to normal.

7.6 Thermoregulation

Body temperature is kept at 37°C by the hypothalamus.

- Too hot: blood vessels dilate (vasodilation) to lose more heat; sweat evaporates cooling skin; hairs lie flat.
- Too cold: blood vessels constrict (vasoconstriction) to reduce heat loss; shivering generates heat; hairs stand up (traps air).

7.7–7.9 The Menstrual Cycle, Fertility and Kidney

• Menstrual cycle (~28 days): FSH stimulates follicle → oestrogen rises → LH surge triggers ovulation → progesterone maintains uterus lining.

• IVF: eggs collected after FSH stimulation, fertilised in lab, embryo implanted.

• **Kidney**: filters blood (ultrafiltration) → selectively reabsorbs glucose, water and ions → excretes urea in urine.

• ADH controls water reabsorption in kidney tubules (more ADH = more concentrated urine).

• Kidney failure treated by dialysis or transplant.

★ HIGHER TIER ONLY — Osmoregulation

• ADH (antidiuretic hormone) released by pituitary gland in response to low water levels in blood.

• ADH makes collecting duct of kidney more permeable to water → more water reabsorbed → small volume of concentrated urine.

• Low ADH → less water reabsorbed → large volume of dilute urine.