



# Examiners' Report Lead Examiner Feedback

January 2021

Pearson BTEC Nationals  
In Animal Management (31644H)  
Unit 1: Animal Breeding and Genetics

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## Introduction

- LE Report to be considered with the live external assessment and corresponding mark scheme.
- The unit is breeding and genetics in the context of animal management. The assessment consists of a task element based on the learner notes written in conjunction with the prerelease advise and an examined element covering other areas of the specification.

## Introduction to the Overall Performance of the Unit

- The paper has performed as expected. The prelease context of domestic and wildcats was accessible for learners, and the more able learners have produced good responses based on their research in this area.
- The task based on the prerelease material differentiated between learners well, and the extended questions at the end of the paper enabled learners to demonstrate their wider knowledge and understanding.
- There were some responses where the gaps in learning, due to the circumstances faced by the learners in the build up to the assessment, were obvious and some creative answers were seen where the learners had tried to apply their general knowledge. These attempts occasionally attracted marks and learners are to be commended for attempting the questions as positively as they did.

## Individual Questions

### 1(a)

Learners found this question accessible and good responses were seen, such as this one.

1 (a) State **two** ways a female cat will signal to a male that she is ready to mate. (2)

1 Spraying - pheromones

2 Vocalisation - calls

A fault seen with some responses was a description of the act of mating rather than signalling strategies. Some responses were not specific enough to be credited. This response would have been improved by stipulating what kind of body language was expected, and although vocalisation is correct, purring is not, as queens yowl in this context.

1 (a) State **two** ways a female cat will signal to a male that she is ready to mate.

1 Body language

2 Purring at them

### 1(b)

This question was answered well by most learners who understood the point of captive breeding is to improve numbers for endangered species. Some learners picked up on the prevention of hybridisation which was also a correct response. Some responses suggested captive breeding could cause inbreeding, this is incorrect in the context of wildcats where the reduction of geographical isolation and human interference in mate choice reduces inbreeding so far as possible.

(b) Explain **one** reason for breeding Scottish wildcats in captivity.

(2)

Scottish wild cats are critically endangered  
 so ~~by captive~~ breeding them in captivity would  
 prevent them from going extinct.

**1(c)**

This is an example of an explanation, where the learner has identified the effect and then expanded on that accurately to provide a good answer.

(c) Explain **two** effects of inbreeding depression on the Scottish wildcat population.

(4)

1 decrease of immunological diversity therefore <sup>increasing</sup> ~~reducing~~  
 the number of cats lost to disease

2 Inbreeding can cause the males to be partially  
 sterile, reducing their willingness to cooperate which in turn  
 decreases the amount of kittens born each year

Two common inaccuracies were seen, one was that inbreeding causes mutations, it does not it increases the number of homozygote recessive genomes so increasing the phenotype caused by the mutation. The other one seen was that inbreeding depression was an emotional state like post-natal depression in humans, as in this example. This was probably an effect of learners not being familiar with this area of the curriculum.

(c) Explain **two** effects of inbreeding depression on the Scottish wildcat population. (4)

- 1 After breeding with a male the female becomes lonely as she takes care of the kittens otherwise they would be killed by the male.
- 2 The cats are ~~less~~ beginning to decrease in number so there are less cats to interact with one another.

**2(a)**

There were many good responses to this question, like this one.

2 (a) Give **four** ways that you could diagnose pregnancy in a female domestic cat. (4)

- 1 nipples become larger
- 2 belly swells
- 3 ultrasound
- 4 palpating the stomach to feel for lumps.

The most common incorrect answers were caused by ways being identified that, although being connected to pregnancy but are not actually used for diagnosis. So in this answer aggressiveness might suggest that something is going on and lead to a diagnostic test but it is not diagnostic in itself, eating less is not a diagnostic effect of pregnancy and screaming in pain happens in copulation and can lead to induced ovulation but in itself is not diagnostic of pregnancy.

2 (a) Give **four** ways that you could diagnose pregnancy in a female domestic cat.

(4)

1. Ultrasound scan 3-4 weeks in
2. Aggression in the cat, the cat may seem more than angry from you.
3. eating less or being angry with their food.
4. cats will scream in pain when pregnant.

### 2(b)

The learners that had notes that covered different breeds of cats wrote some good answers for question, several different breeds were proposed, and they often had good justifications so could be credited. This is an example of a level three answer where an appropriate breed has been suggested and the choice justified in context of the scenario.

(b) Discuss the breed of cat that you would recommend Donald gets and justify your choice.

Use your research notes to help you make a recommendation.

(12)

Donald needs a cat that needs little attention and grooming, which can also make him some extra money. There are a variety of cat breeds ~~that can~~ that would make the perfect breed for his needs. I ~~was~~ think that the bengal cat would make a perfect choice. They have long slender legs and have an athletic body. They also have a striking coat which ~~is~~ has wild-like stripes and dots. This ~~would~~ makes them very valuable and desirable for customers. They have 2 main ~~color~~ coat patterns which are marbled and dotted. Bengals have large ~~ears~~ pointed ears and a ~~long~~ long tail. With their short silky coat they are very low maintenance and do not need regular brushing like a persian. Bengals are a very intelligent cat breed and can be easily trained, which also makes them very ~~de~~ desirable to customers.

The bengal cat is a medium sized cat with a lifespan of up to 17 years. The bengal is ~~an~~ an athletic cat which enjoy being outside, however if left unattended outside they are likely to mate with other cats. Bengals are loving, loyal cats. However they do not need alot of affection and are fine by themselves at home. Another pro to choosing a bengal is that they are generally healthy ~~and~~ and <sup>do not</sup> have have a large amount of common health problems. However, they can get hypertrophic cardiomyopathy which causes the walls of the heart to thicken. Bengal cats have very ~~little~~ little problems ~~when~~ during parturition, so this would make them great for Donald's needs

In my opinion I think that the bengal cat is the perfect breed due to its beautiful, wild coat, which would intise customers and its ~~need~~ need for little grooming or maintainance. I also think that having little health problems ~~is~~ is benefical because this will save Donald money on veterinary bills. Due to the fact that Donald will be using the cats for mainly breeding purposes, having ~~a~~ ~~need~~ to little parturition complications makes them perfect for his needs.



There were several responses where a particular breed had not been proposed as suitable, this made it difficult for the learner to be credited many marks. In many cases the responses suggested that breeds of cats and coat colours/patterns were the same thing, so tabby, black, tortoiseshell and calico cats were suggested as breeds to discuss. Some responses suggested wildcats as an appropriate breed which showed several misconceptions as they are not the same species as domestic cats and are not able to be domesticated.

This response suggests domestic cats which is the name for the entire species including all the possible breeds (and domestic shorthair/longhair is a descriptive term for crossbreeds. It also suggests tabby as a particular breed, when it is actually a particular coat pattern.

(b) Discuss the breed of cat that you would recommend Donald gets and justify your choice.

Use your research notes to help you make a recommendation.

(12)

There can be many advantages and disadvantages when looking into the breeding of domestic cats.

Firstly domestic cats come on heat multiple times in a calendar year until they are mated and become pregnant, this is a higher chance of consistent pregnancy and will always be able to produce new born kittens regularly, unlike wildcats that have a limited time for their mating season. Domestic cats can also provide large quantities of litter as many as 18 in a single litter. From them mating at 18-24 months old they can come back into season approximately 8 weeks after the birth of the kittens.

Domestic cats, can be indoor and outdoor cats and love to explore outside. They do like to do their own thing during the

day, so won't be impacted if Donald is not home.

Most domestic cats have an independent birth that requires no interaction from the owner, the kittens become completely independent from 12 weeks. The females become reproductively mature by 6 ~~weeks~~ <sup>months</sup> and the males 8 months. and can reproduce in a matter of time after that.

Domestic cats are very independent and can be litter trained within or outside of the house but won't require very much training as they are very smart individuals. Cats such as tabbys are perfect to breed for their colour and genes.

Wildcats are not a reasonable breed for reproducing as they can be fairly aggressive due to their natural instincts. Domestic cats do learn from a young age and do have good behaviour measures overall.

Donald would have many beneficial factors when choosing a domestic cat for breeding purposes.

They are very active and communicable cats, whilst Donald is not home during the day the cats love their own comfort and love to explore the outdoors.

To earn more money Donald should ~~choose~~ pick a popular breed that will attract people. Many people don't buy plain black cats so it would be recommended to use popular breeds, such as a tabby or ~~grey~~ he won't make much profit selling <sup>common</sup> ~~black~~ cats that can be brought from any breeder.

Female domestic cats are highly chanced of getting pregnant when mated with and will provide a quick and easy way to carry on the breeding for these cats, and will produce high quantities of litter for Donald to sell.



3 The tabby pattern allele (**A**) is dominant over solid coat colour (**a**) in cats.

Cats have a T gene called the Manx gene that controls tail length.

If a cat is homozygous for the dominant Manx allele (**T**) it will not survive as this is a lethal allele.

If a cat is heterozygous for the dominant Manx allele (**T**) it will not have a tail, this is called a 'manx tail'.

If a cat is homozygous for the recessive allele (**t**) it will have a normal tail.

(a) Calculate the phenotypic probabilities if a male that is heterozygous for coat pattern and has a Manx tail is mated with a female that has a solid coat and a Manx tail.

(8)

		<del>AA</del> Female			
		<del>AA</del> aa	<del>aa</del> TT	<del>AA</del> Tt	<del>aa</del> tT
male	<del>AA</del> Aa	AaAa	TATA	TATa	tATA
	<del>aa</del> aa	aaaa	TaTa	Tata	tTa
	<del>TT</del> Tt	TaTa	TTTT	TTTt	tTTT
	<del>Tt</del> Tt	Tata	TTTt	TTtt	tTtt

Phenotypic probability

**3(b)(i)**

Although many learners knew that sex linkage involved the gene being on a sex chromosome, none appreciated the size difference between the x and y meaning that the male only has one allele and so it is expressed whether it is dominant or recessive.

Orange/red coat colour in cats is sex linked.

(b) (i) Explain sex linkage. (2)

An allele is ~~only~~ <sup>expressed</sup> present on a sex chromosome  
 e.g. X or Y chromosome  
~~mean~~ ~~ing~~ ~~the~~ ~~phenotype~~ ~~expressed~~ ~~depends~~ ~~on~~ ~~the~~ ~~sex~~ ~~of~~ ~~the~~  
 phenotype expressed depends on the sex of the  
 animal

This response shows an unfamiliarity with the term, so the learner has linked the word sex to the gender of the parents.

(b) (i) Explain sex linkage. (2)

Sex linkage means that both parents  
 have the same genotypes so it produces  
 the same colour as the parents.

**3(b)(ii)**

Many learners could identify that epistasis was when one gene affected another, but they rarely went on to say that changed the expression of the phenotype. This response is an example of a response that did just that.

(ii) Explain epistasis. (2)

The epistatic effect is when one gene within  
 an organism is affected by another or can  
 influence another gene to determine the  
 genotype and/or the phenotype.

**4(a)**

Generally, the question on stomach tubing was answered well. For incubation, some learners answered about egg incubation instead of neonate incubation. Colostrum answers generally were accurate and referenced building immunity. This response is a good answer, although the answer would have been improved by saying that incubation is necessary because neonates cannot regulate their own temperature.

**4 (a) Explain the **three** neonatal supportive measures. (6)**

**Stomach tubing**  
 Stomach tubing can be used in the case of a chest outlet. This is where a tube is inserted into the stomach via the windpipe, it allows feed to be syringed straight into the stomach and prevents the risk of it going into the lungs.

**Incubation**  
 IS where newborns ~~can~~<sup>are</sup> placed into an incubator box to keep them warm, at a constant temperature and have a constant flow of oxygen.

**Access to colostrum**  
 Colostrum is given to newborns via the mother in the first milk, this helps with building a strong immune system to fight off infection.



In this response the first answer seems to have been caused by a misreading of tubing. The answer to colostrum is too generic to be credited marks.

4 (a) Explain the **three** neonatal supportive measures.

(6)

Stomach tubing

Rubbing the kittens stomach to get outsid of any fluid inside them.

Incubation

Where the kittens are kept warm after birth. Room temp ab about 30-40 degress.

Access to colostrum

Checking to make sure the kittens are healthy and are able to Suckle on their <sup>mother-</sup> ~~mothers~~.

4(b)(i)

A few learners were familiar with this disorder, which is listed on the specification, as demonstrated by this response.

(b) (i) Describe the inherited disorder glycogen storage disease. (2)

Glycogen storage disease is a congenital disorder that can appear in a number of different types. An animal with this ~~dis~~<sup>disease</sup> can either not use the glycogen or their body forms abnormal glycogen. This affects their sugar levels and can be seen by decreased weight.

Many learners seemed unfamiliar with the term, and some responses such as tis focused on the term 'inherited' more than the actual disorder.

(b) (i) Describe the inherited disorder glycogen storage disease. (2)

This can be inherited down from family and can possibly affect the genes running down the family. Glycogen is stored within your body, caused from inheritance and cant be caught by contact.

**4(b)(ii)**

There were some good responses seen such as this one.

(ii) Describe the congenital disorder hernia.

(2)

A hernia is an opening in the muscle which allows body tissue or organs to pass through. This can result in strangulation of the tissue

Some responses were too generic, and this is an example of a response that does not actually answer the question although the statement is not incorrect in itself..

(ii) Describe the congenital disorder hernia.

(2)

This is not passed on genetically and anyone could experience this disorder.

**4(c)**

Generally learners could explain one requirement well as evidenced by this response.

(c) Explain **one** nutritional requirement for a cat that is nursing kittens.

(2)

A cat nursing kittens would need food that is high in protein, as the nutrients they receive is passed onto the kittens through milk. The kittens would need protein in the early stages of life to allow for them to grow and for their tissues to form.

However, some learners misread the question and talked about the needs of the kittens, or as in this case made generic assertions rather than focussing on the nutritional requirements.

(c) Explain **one** nutritional requirement for a cat that is nursing kittens.

(2)

Make sure the mother receives her own food, kittens normally end up eating all the food provided and because the mother is always feeding her newborns, she doesn't get time to feed her self, and build her strength back up.

#### 4(d)

Most learners knew that there is not specific legislation about breeding cats and that breeders have to follow general animal legislation and the most obvious one is the animal welfare act. Those that used that act tended to score well.

(d) Describe **one** piece of legislation that breeders of cats must follow.

(4)

The animal welfare act 2006 for the 5 needs which are; suitable environment for the cats/kittens, suitable diet, exhibit normal behaviour, being housed with or apart from other animals, protected from pain, suffering, injury and disease. The owner needs to consider all of this so that the <sup>cats</sup> ~~owner~~ are being treat the way they should.

Some learners quoted guidance form the governing council of the cat fancy, although this demonstrated good research skills, it is not legislation so cannot be credited.

(d) Describe **one** piece of legislation that breeders of cats must follow.

(4)

to not allow over breeding, <sup>should not</sup> for example, cats ~~can't~~ be breed more than once a year, as this ~~can~~ cause harm if a cat is unhealthy.

5(a)

Generally learners either knew this section of the curriculum and gained good marks or had no idea and gained none. Many learners described a neutral rather than a silent mutation, but the overlap is enough that they managed to pick up the marks anyway.

5 (a) Explain the **three** kinds of genetic mutation.

(6)

Insertion

~~One~~ This is a type of substitution where one or more base pairs are inserted into the sequence which leads to a different protein to be produced, resulting in a frameshift, resulting in a misreading at translation.

Nonsense

The change that occurs codes for the amino acid to stop, meaning the nucleotide chain ends prematurely and can not be read correctly. This is also a type of substitution.

Silent

This is when the change occurs in a non-coding region of DNA, so it does not impact have an impact on the organism's genotype.

**5(b)**

This question caused problems for many learners. The phrase is usually applied to a population where the choice of mate means that a particular choice (same or different phenotype) is made more often than you would expect with random matings. It is not generally used to mean a breeding programme where the choice is made by the breeder.

(b) Describe positive assortative mating and negative assortative mating. (4)

**Positive assortative mating**  
 mating of similar phenotypes giving an increased occurrence of a particular trait.

**Negative assortative mating**  
 mating of different phenotypes therefore increasing the variety in offspring.

This learner has tried to surmise the answer from the terms positive and negative but has not managed to get it correct.

(b) Describe positive assortative mating and negative assortative mating. (4)

**Positive assortative mating**  
 Picking the bright breeds to get the best outcome when breeding/mating.

**Negative assortative mating**  
 Picking 2 breeds that aren't supposed to be ~~mate~~ mated together getting a negative outcome.

**6(a)**

This question is a discussion and is a levelled response so to get the best marks there needs to be more than a list however comprehensive. So, the learner needed to identify some factors and say why the breeder should take them into consideration.

6 (a) Discuss the factors to consider when you are choosing and assessing a stud male to breed pedigree cats.

(6)

You want to look at the studs medical history, do they have any health problems or genetic disease that could be passed onto offspring? Calculating the risks of such diseases may be possible if the animal has a detailed pedigree record that include numerous generations.

Owners and breeders may want to look at the pedigree records in detail and see the success of past generations in breeding pedigree animals.

Body score and condition of the animal is needed as ~~you~~ breeders would want to breed a healthy animal as it is more likely to successfully result in a pregnancy and kittens.

Desirable characteristics should be noted as breeders may want their pedigrees to look a certain way, especially if they are going to be used in shows and competitions.

In addition, the temperament of the animal as you want both animals to breed well and get along so nobody gets injured and you do not want to risk inheriting bad temperaments.

This learner has misread the question and answered about the factors to take into account when breeding cats and missed that the response should be about the stud cat in particular.

6 (a) Discuss the factors to consider when you are choosing and assessing a stud male to breed pedigree cats.

(6) 1

The 5 welfare needs need to be considered because they need to have been housed with or apart from other cats, if they have been housed apart then it would be hard to get it to mate. If the cat has a suitable diet because it will impact the health of the male cat. The cat should be in a suitable environment if not then it could turn on the cat that it is mating with because of its upbringing. It should exhibit normal behaviour as it could become aggressive when mating. Finally it should be protected from pain and suffering so that the cat doesn't pass any diseases down to the female or kittens.

**6(b)**

Learners were expected to produce a discussion for this question. Many did and scored in level two and three. A lot of the responses however were very one sided and discussed the negatives of captive breeding without really looking at the positives of preventing extinctions. This response is an example of a well-argued response that takes a very one-sided view of the issue.



Captive breeding programmes are developed to support endangered species, such as the Scottish wildcat.

(b) Discuss the ethical issues of breeding endangered species in captivity.

(12)

There are several ethical issues of breeding endangered species in captivity. One ethical issue that comes to mind is animal rights. It could be argued that wild ~~breeds~~<sup>species</sup> such as the Scottish Wildcat, do not belong in captivity. These animals deserve to have the freedom to eat what they want, go where they want and live how they want. In captivity, these animals do not have the choice to do as they please as they would in the wild and their individual needs, <sup>+ wants</sup> as an animal are dismissed for the purpose of a greater good being that these captive breeding programmes are developed to support endangered species. Another ethical issue is the animal welfare. These animals that are born to be wild are trapped in a cage. They are not free to carry out their natural behaviours and cannot hunt ~~and~~<sup>their</sup> prey as they would in the wild. The welfare of these animals is supported by these breeding programmes but only to a certain extent. The animal's welfare needs are met but enrichment of life is not guaranteed.

Another ethical issue of breeding endangered species in captivity is that the animals are often inbred to maintain a purer bloodline and for desirable traits. This can lead to inbreeding depression which can increase the risk of genetic disorders being inherited and decreases genetic diversity. This is an ethical and moral issue as the animals are purposefully inbred and can risk inheriting genetic diseases which may pose a risk to

The animal's health and welfare.

Another ethical issue is that if these animals do not breed or are not purposeful in the breeding programme, they will be removed from the programme. This will most likely mean they will be destroyed ~~to~~ because as they were born in captivity and would not survive if released into the wild. This is an ethical issue as the animal's only purpose is to breed to ~~help~~ increase the population of the endangered species.

This next response is a brief discussion of the information the learner has on captive breeding of wildcats, however there is little mention of the ethics that are supposed to be discussed, even by inference and it is a level one response.

(b) Discuss the ethical issues of breeding endangered species in captivity.

(12)

Prevent extinction: This will prevent the Scottish wildcat going extinct from the landscape and will play a vital role in the future conservation of animals.

The breeding of wildcats can occur at different times of the year, depending on local climates. Wildcats will help education purposes and will overall increase the amount worldwide using the breeding programme in captivity. This will also keep track of how many there are worldwide and how we can increase the population throughout the season.

Because the Scottish wildcat is a rare animal now in captivity it will not only increase and help education matters but will also create a profit towards the establishment itself, knowing various amounts of people want to visit a species so rare in society, and they can only be seen in captivity.

The overall matter towards breeding Scottish wildcats is to prevent extinction and hopefully the cats in captivity can be let out into the wild to enhance nature and survive from the food chain.

## Summary

- Many of the issues that caused problems for learners were caused by the fragmented nature of the build up to the exam caused by factors out of all our control. Hopefully, this will not be such an issue going forward. Given the problems caused by the pandemic there are few lessons from the paper that are applicable to a normal series. The only ones I would suggest would be useful for learners to consider are below.
- Learners should, when answering the questions, take careful note of the verb used and the number of marks on offer. They should, so far as possible, try to match what they write to those requirements. Answers that included six or seven rewardable points were seen for four-mark questions; this is a waste of time that could be used on other questions.
- There were some occasions when errors were seen that meant no marks were awarded even though it was obvious the learner understood the concepts being examined. Learners should go back over their answers and make sure what they have written matches what they intended.



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