Examiners' Report
Lead Examiner Feedback

June 2022

Pearson BTEC Nationals

In Animal Management (31644H)

Unit 1: Animal Management: Animal Breeding and Genetics

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June 2022
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Introduction

This paper has been examined eight times now and many learners had used the available past papers to prepare for the assessment.

Learners had researched the area of turkey breeding comprehensively and could apply that research to the scenario presented in the paper, although many learners did not recognize that a lot of the information, they used is particular to the United States and the breeds they recommended would not be really practical to import to the UK.

They used their research to come up with recommendations that referenced the different breeds they had researched.

Where learners had not researched well, they produced very generic answers and did not reference different breeds of turkeys.

Learners are still struggling with the genetics questions in the paper, with some notable exceptions. They find the more practical aspects of breeding more accessible.

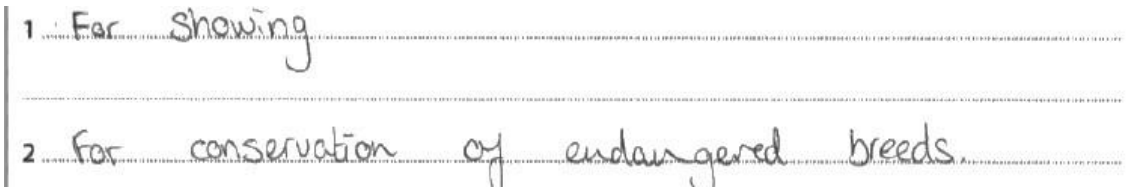
Introduction to the Overall Performance of the Unit

Overall, the paper performed well with some very pleasing performances at the distinction grade with well researched and applied responses. Even at the lower grades learners were producing creditworthy responses to the breeding areas of the paper, although struggling with the genetics questions.

Individual Questions

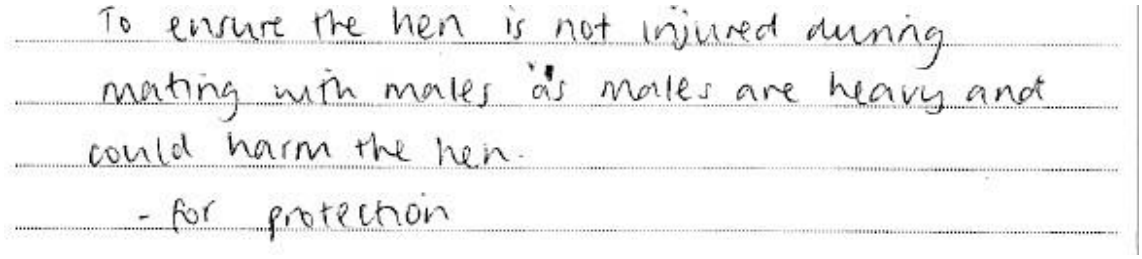
1 (a) State **two** reasons, other than food production, why people breed 'rare breed' turkeys

This was answered well, with many learners getting full marks. One mistake may learners made was answering 'conservation' this was not accepted by itself as it more usually refers to endangered wild species, but conservation of endangered breeds was accepted as an alternative wording of preservation of rare breeds.



(b) Explain **one** reason breeders saddle hen turkeys when they are being mated.

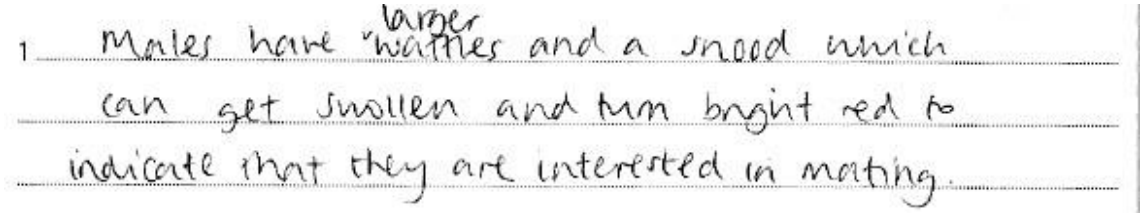
This question was well answered with an identification of protection being extended with a referral to either the males weight/size or the spurs and claws.



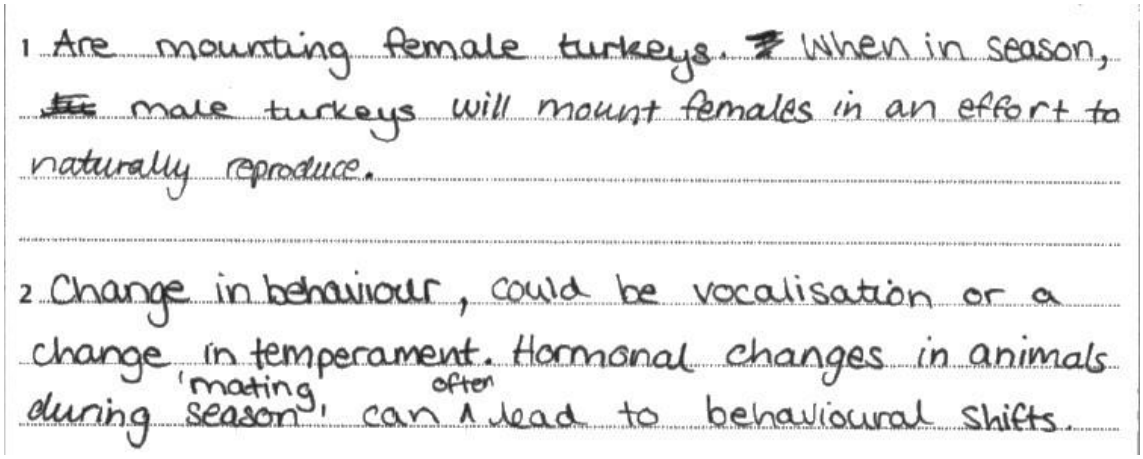
(c) Describe **two** sexual characteristics of male turkeys

Some good answers were seen as are demonstrated here.


1 Stags can have bright feathers which they can present to hens when mating.


1 Males have larger wattles and a snood which can get swollen and turn bright red to indicate that they are interested in mating.

A common error was to refer to courtship rituals rather than sexual characteristics.

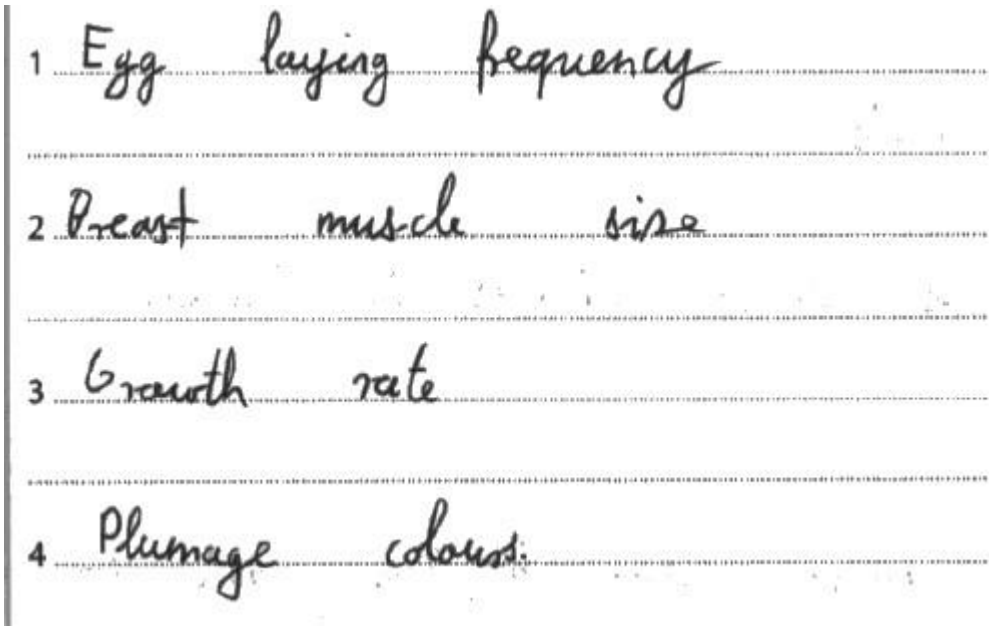

1 Are mounting female turkeys. When in season, male turkeys will mount females in an effort to naturally reproduce.

2 Change in behaviour, could be vocalisation or a change in temperament. Hormonal changes in animals during 'mating season' can often lead to behavioural shifts.

2

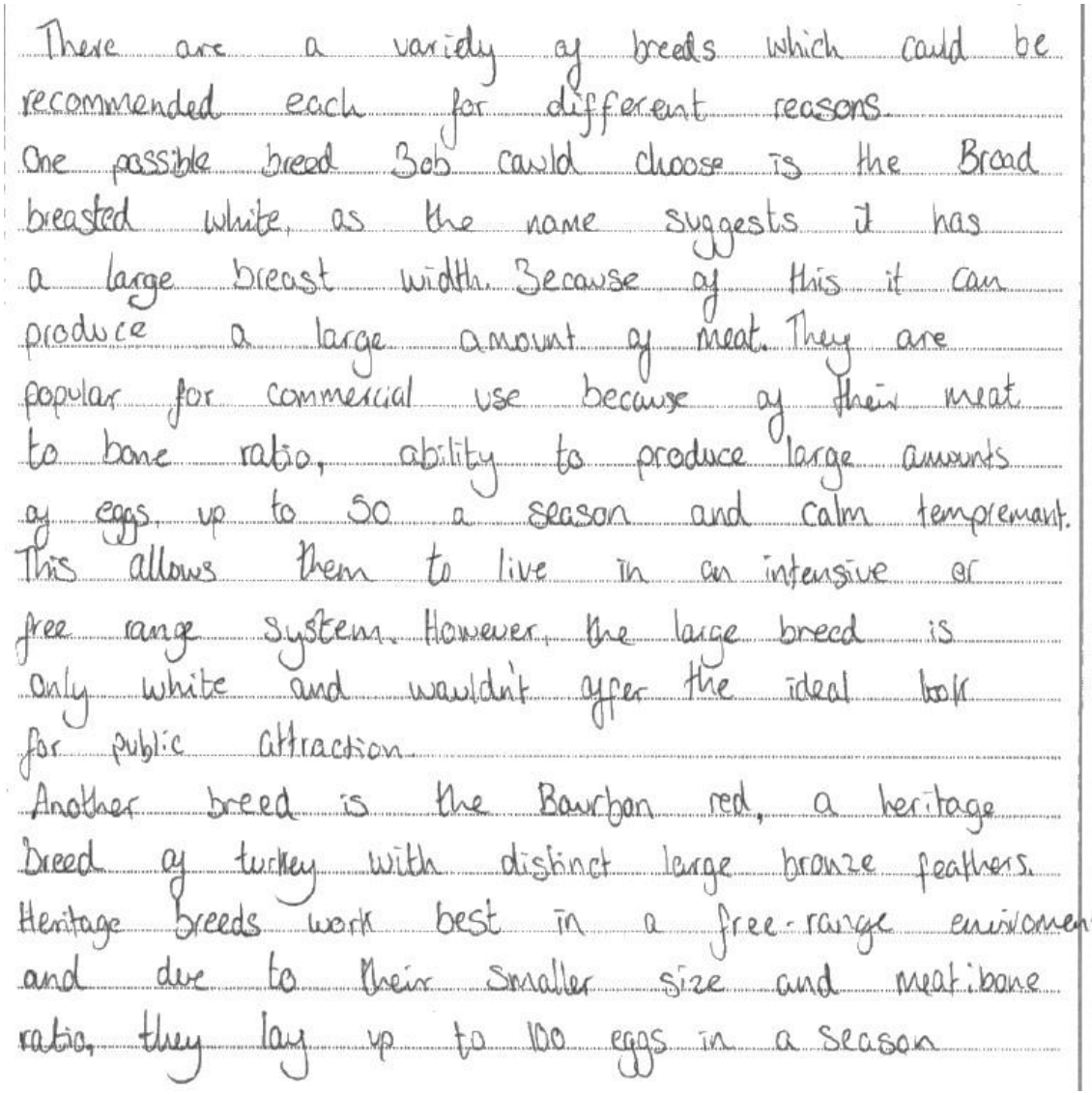
(a) Give **four** factors that would affect your choice of a turkey to breed from.

Many learners gave factors that are listed in section B2 of the specification and ensured they were relevant to turkeys.

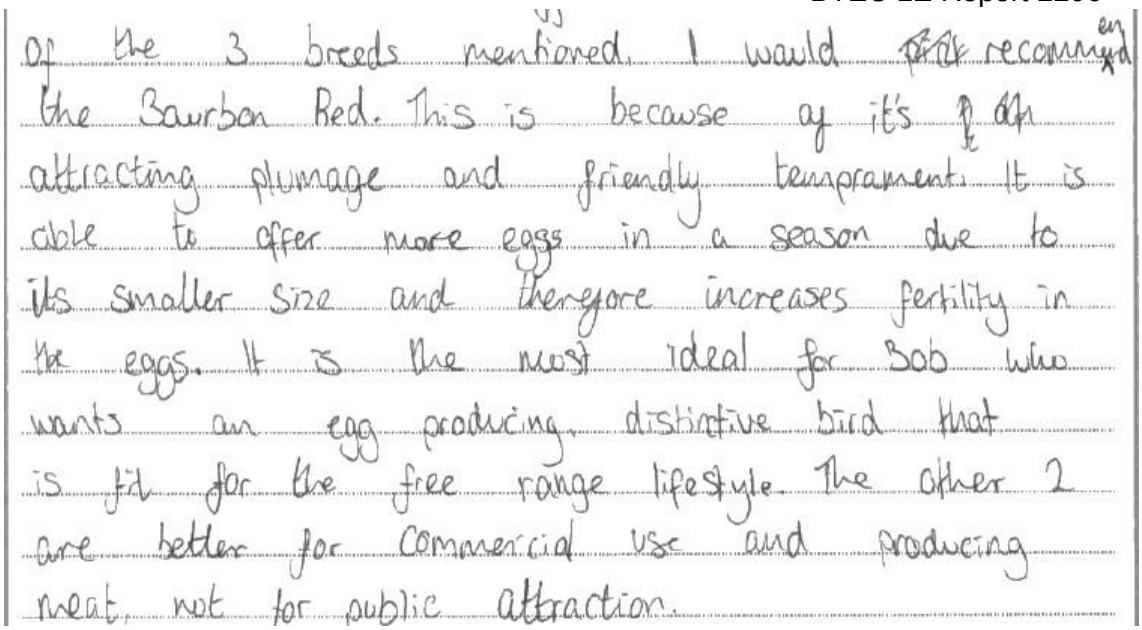


(b) Discuss the breed of turkey that you would recommend Bob buys and justify your choice. Use your research notes to help you make a recommendation.

There were some very good answers seen, with excellent evaluation and evidence of research. The evaluation often saw a comparison of different breeds to justify the one chosen as in this response. Some of the poorer answers did not recommend a specific breed or mistook commercial brand names for breeds.



There are a variety of breeds which could be recommended each for different reasons.
One possible breed Bob could choose is the Broad breasted white, as the name suggests it has a large breast width. Because of this it can produce a large amount of meat. They are popular for commercial use because of their meat to bone ratio, ability to produce large amounts of eggs up to 50 a season and calm temperament. This allows them to live in an intensive or free range system. However, the large breed is only white and wouldn't offer the ideal look for public attraction.
Another breed is the Bourbon red, a heritage breed of turkey with distinct large bronze feathers. Heritage breeds work best in a free-range environment and due to their smaller size and meat:bone ratio, they lay up to 100 eggs in a season

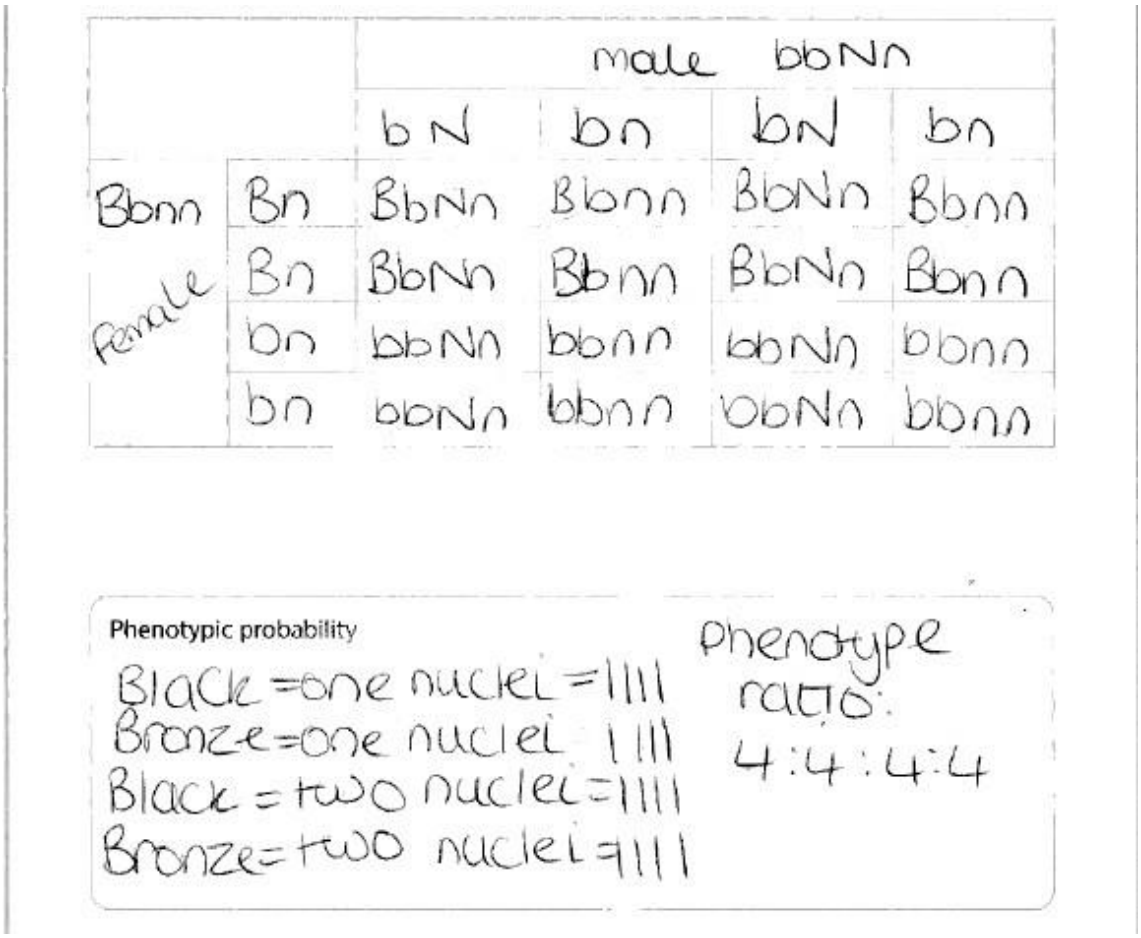


Of the 3 breeds mentioned, I would recommend the Bourbon Red. This is because of it's attracting plumage and friendly temprament. It is able to offer more eggs in a season due to its smaller size and therefore increases fertility in the eggs. It is the most ideal for Bob who wants an egg producing, distinctive bird that is fit for the free range lifestyle. The other 2 are better for commercial use and producing meat, not for public attraction.

3

(a) Calculate the phenotypic probabilities if a male bronze turkey that is heterozygous for blood cell type is mated with a heterozygous black female with two nuclei in her red blood cells.

Learners either had learnt the method for calculating the probability in a dihybrid cross and got all, or most marks as in this example, or they did not know the method and gained no marks.



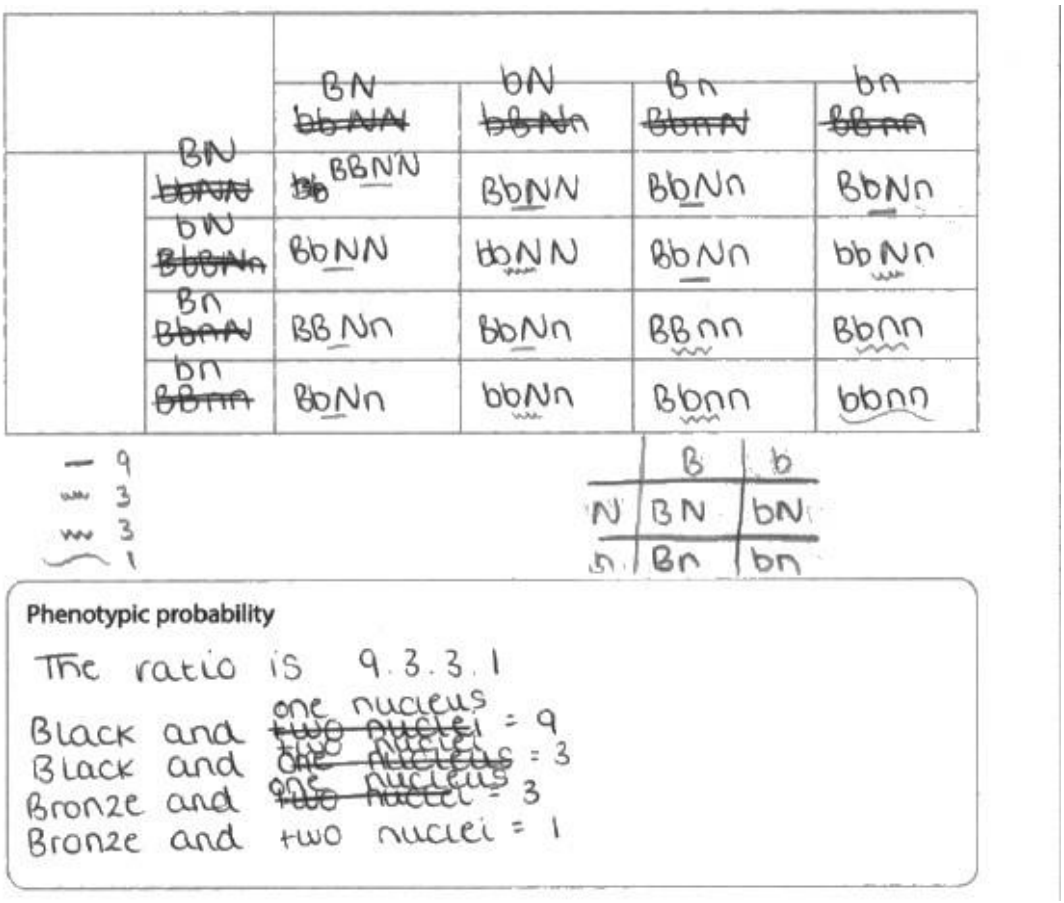
		male bbNn			
		bN	bn	bN	bn
Bbnn	Bn	BbNn	Bbnn	BbNn	Bbnn
female	Bn	BbNn	Bbnn	BbNn	Bbnn
	bn	bbNn	bbnn	bbNn	bbnn
	bn	bbNn	bbnn	bbNn	bbnn

Phenotypic probability

Black = one nuclei = 1111
Bronze = one nuclei 1111
Black = two nuclei = 1111
Bronze = two nuclei = 1111

phenotype ratio:
4:4:4:4

Some learners had learnt the example of a heterozygote dihybrid cross giving a ratio of 9:3:3:1 and had tried to make that fit the scenario, demonstrating a lack of understanding of the method as in this example.



	BN	bN	Bn	bn
BN	BBNN	BbNN	BbNn	BbNn
bN	BbNN	bbNN	BbNn	bbNn
Bn	BBNn	BbNn	BBnn	Bbnn
bn	BbNn	bbNn	Bbnn	bbnn

— 9
ww 3
ww 3
⁀ 1

	B	b
N	BN	bN
n	Bn	bn

Phenotypic probability

The ratio is 9.3.3.1

Black and one nucleus = 9
Black and two nuclei = 3
Bronze and one nucleus = 3
Bronze and two nuclei = 1

(b) Describe **two** of Mendel's laws of inheritance.

There were good attempts at the law of dominance and many learners managed at least one mark. Few learners managed to give a creditable answer to the law of independent assortment. This is an example of a better answer where the learner has recognised that it is alleles, not genes that are independently assorted. Many learners did not attempt to answer about independent assortment.

Law of dominance

The Law of dominance states that a dominant allele will always be expressed in the phenotype over a recessive allele.

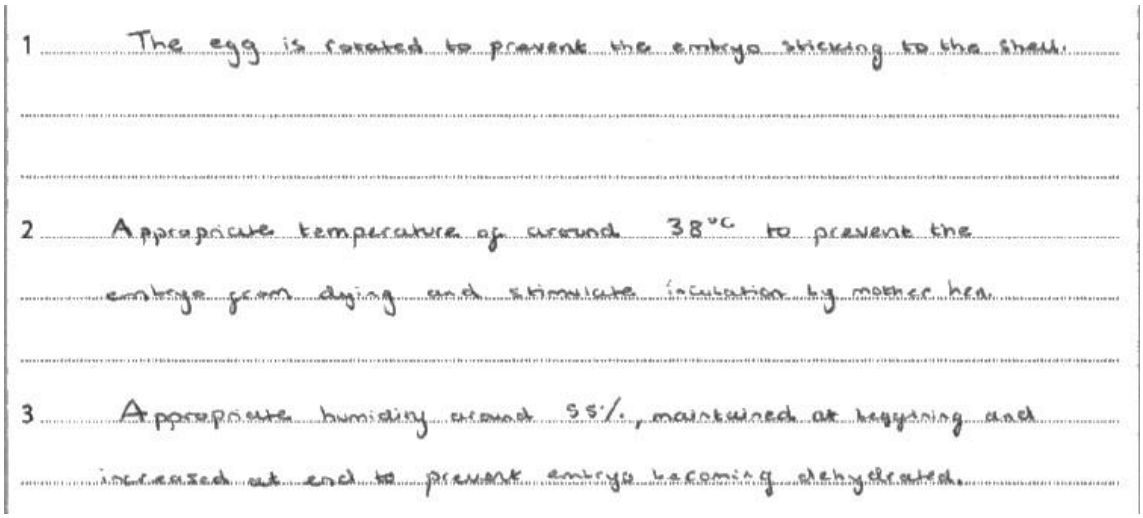
Law of independent assortment

The law of independent assoAment states that during gamete formation alleles are sorted independently of one another.

4

(a) Explain **three** ways breeders make sure that turkey eggs in an incubator hatch successfully.

Many learners got three marks as they identified three ways but did not then go on to explain how those ways may support successful hatching. This is an example of good exam technique where the learner has successfully expanded their identification.

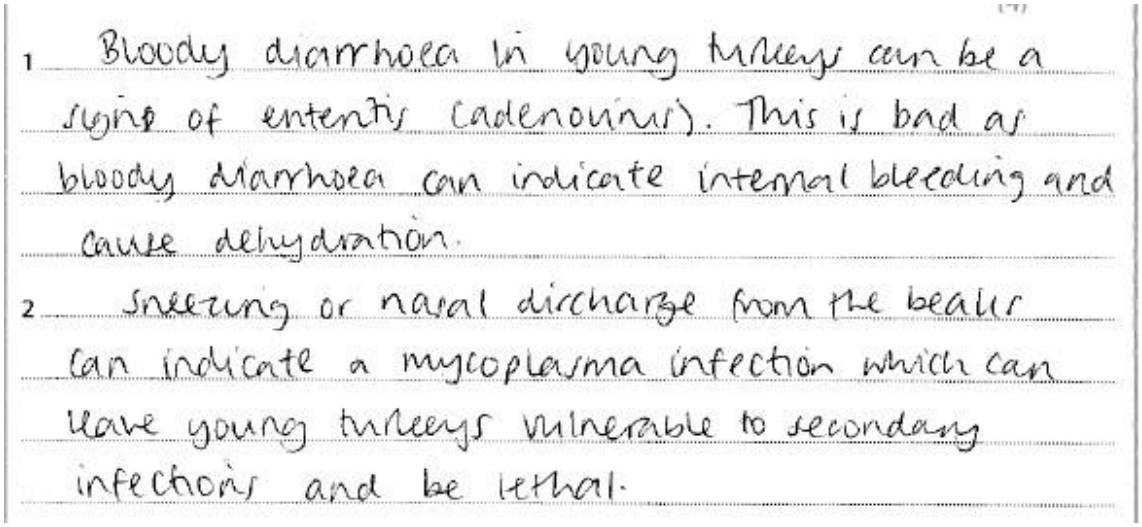

1 The egg is turned to prevent the embryo sticking to the shell.

2 Appropriate temperature of around 38°C to prevent the embryo from dying and stimulate incubation by mother hen.

3 Appropriate humidity around 55%, maintained at beginning and increased at end to prevent embryo becoming dehydrated.

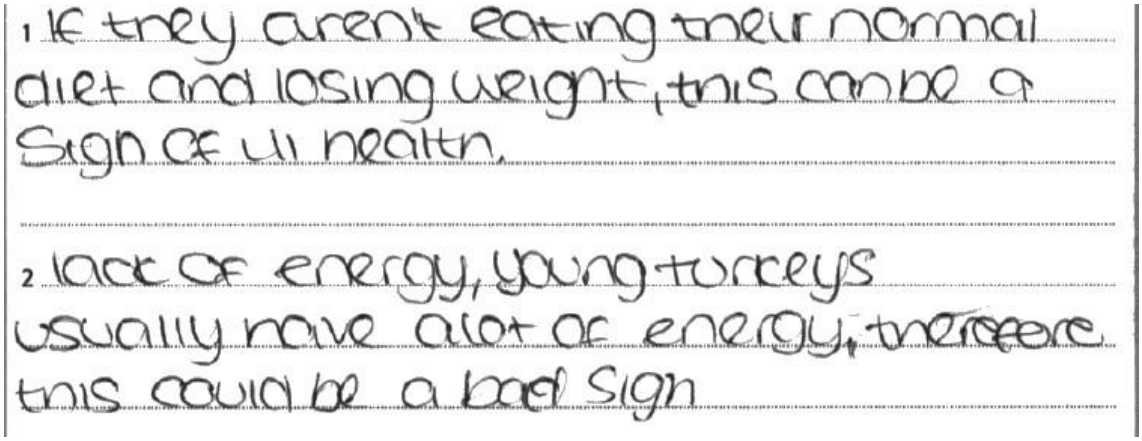
(b) Explain **two** signs of poor health in young turkeys.

Some good knowledge and the result of research was seen in this question as can be seen here.


1 Bloody diarrhoea in young turkeys can be a sign of enteritis (adenovirus). This is bad as bloody diarrhoea can indicate internal bleeding and cause dehydration.

2 Sneezing or nasal discharge from the beaks can indicate a mycoplasma infection which can leave young turkeys vulnerable to secondary infections and be lethal.

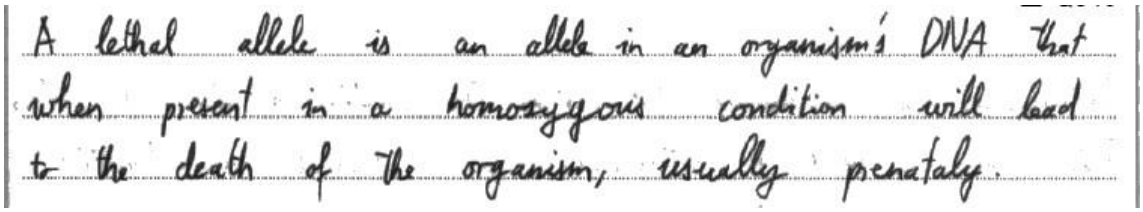
Common mistakes were either to put very generic answers that could be a sign of many factors other than ill health, as in this example (e.g., the effect of poor nutrition, or low temperatures) or answers that were specific to adult turkeys, e.g., being egg bound.


1 If they arent eating their normal diet and losing weight, this can be a sign of ill health.

2 lack of energy, young turkeys usually have alot of energy, therefore this could be a bad sign

(c) Explain what a lethal allele is.

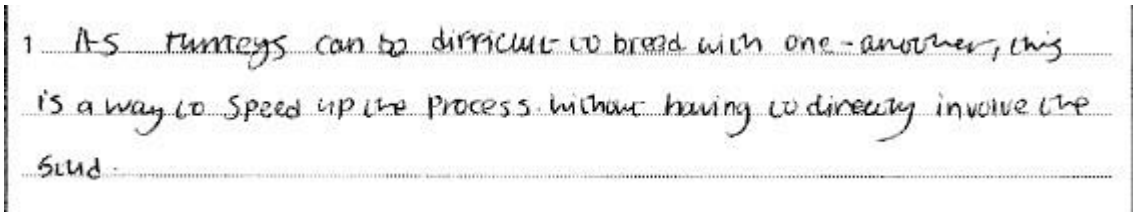
Many learners gained one mark by saying a lethal allele caused death, however they then did not expand the response to gain the second mark. This is an example of an accurate expansion as lethal alleles are recessive and need to be homozygous to have an effect.


A lethal allele is an allele in an organism's DNA that when present in a homozygous condition will lead to the death of the organism, usually prenataly.

(d) Explain **two** reasons breeders would use artificial insemination when breeding turkeys.

Most learners referred to the size of the male turkey being a reason for using artificial insemination. A common mistake was to then repeat this in other words for the second point. Eg large breasted and large size. Few learners linked low fertility rates to the use of A.I.

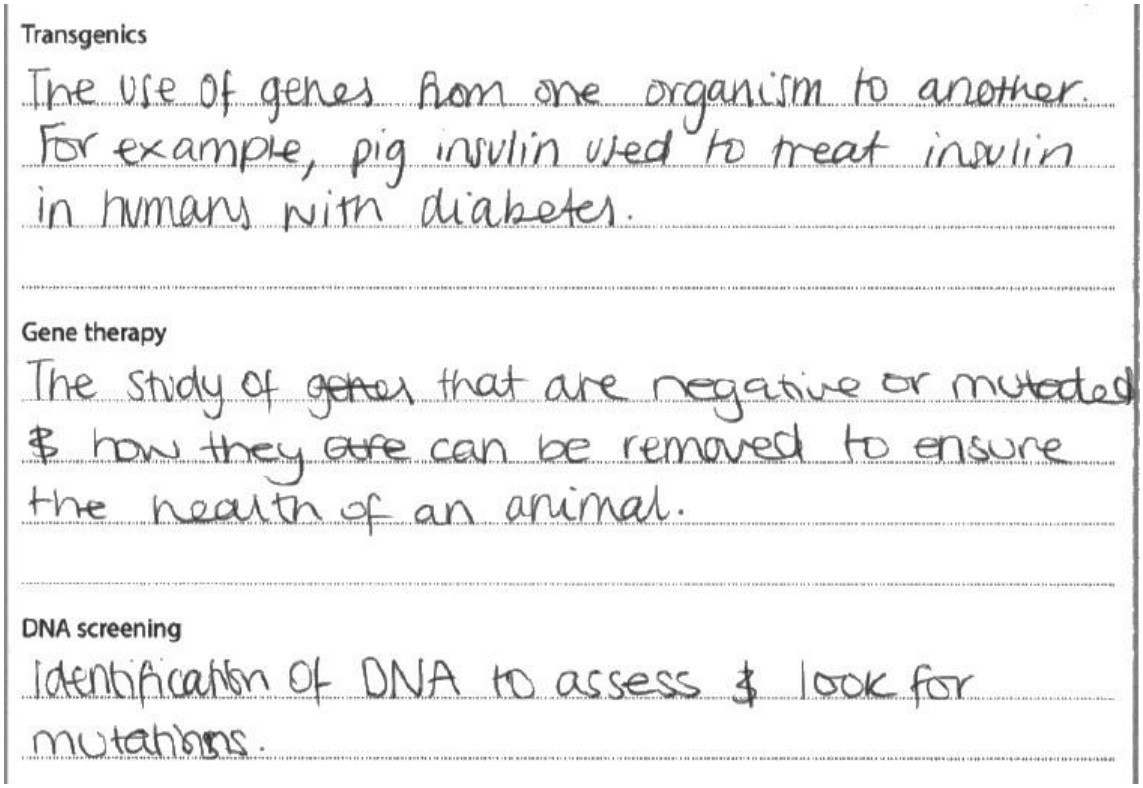
This is an example of where poor exam technique has let a learner down as they have not said why the turkeys find it difficult to breed with one another. Some mention of size would have improved the answer considerably.


1 As turkeys can be difficult to breed with one-another, this is a way to speed up the process without having to directly involve the bird.

5

(a) Explain **three** applications of gene manipulation.

This question was generally answered well or not at all/guessed.



Transgenics

The use of genes from one organism to another. For example, pig insulin used to treat insulin in humans with diabetes.

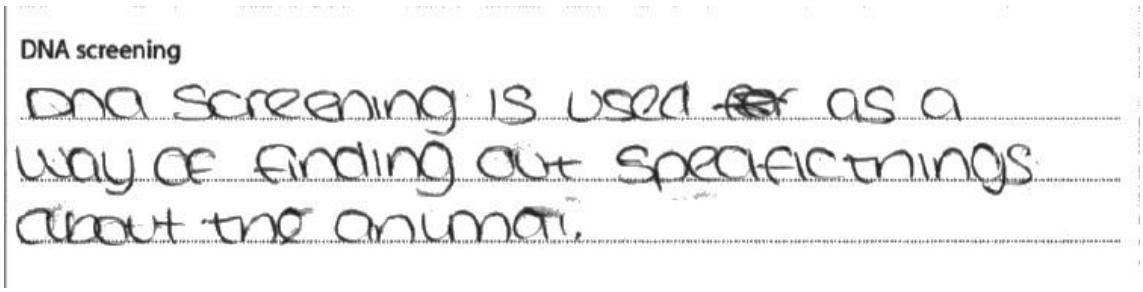
Gene therapy

The study of genes that are negative or mutated & how they are can be removed to ensure the health of an animal.

DNA screening

Identification of DNA to assess & look for mutations.

This is an example of some of the very generic attempts that were commonly seen.

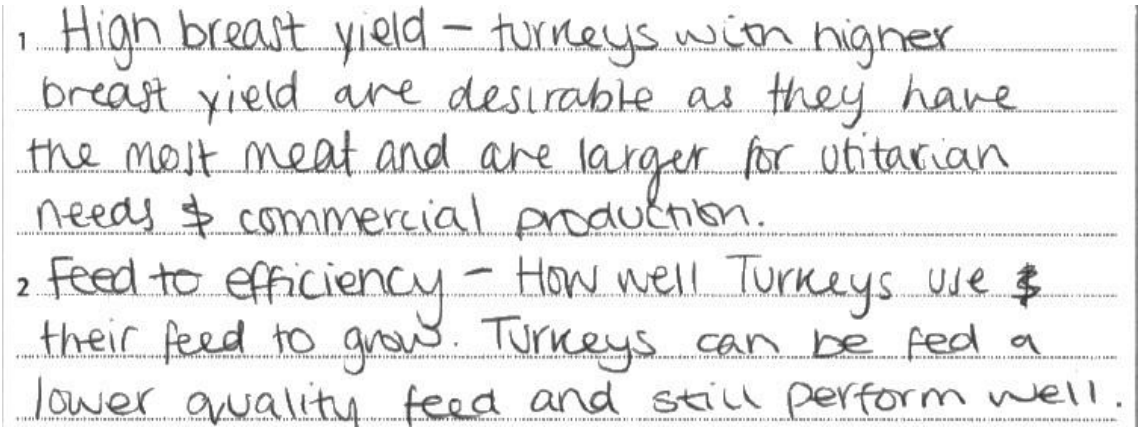


DNA screening

DNA screening is used as a way of finding out specific things about the animal.

(b) Explain **two** traits that are selected in turkeys to improve commercial meat production.

This was answered well, with many learners identifying high yield/size. There were a significant number of correct answers that were alternatives to the ones on the mark scheme and could be rewarded under any other appropriate responses, this is an example of that.


1 High breast yield – turkeys with higher breast yield are desirable as they have the most meat and are larger for utitarian needs & commercial production.
2 Feed to efficiency – How well Turkeys use & their feed to grow. Turkeys can be fed a lower quality feed and still perform well.

6

(a) Discuss how livestock breeds can be improved by gene hunting.

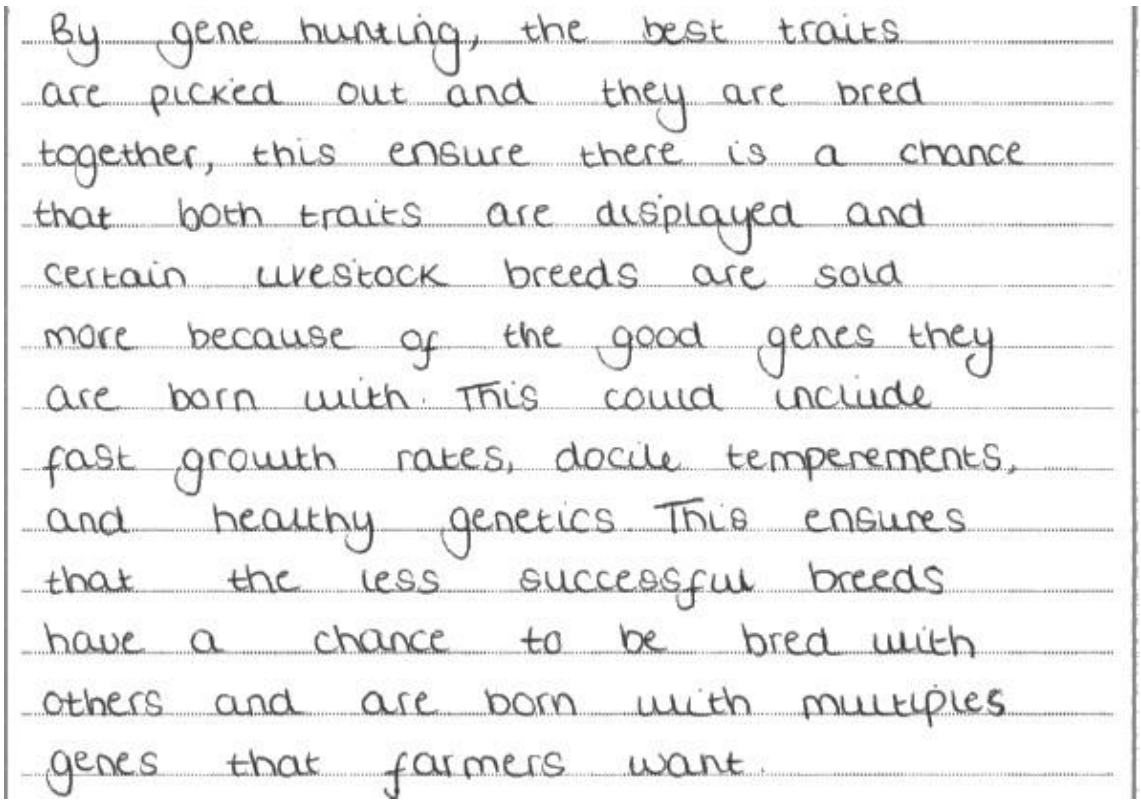
Few learners understood what gene hunting is and answered the question very generically about selective breeding. This is an example of a learner that did understand that gene hunting is the identification of a specific gene for a specific characteristic, and that once it is identified it can be isolated and transferred between species.

Livestock breeds can be improved through gene hunting as scientist can identify useful genes. This can help to improve welfare standards as genetic diseases may be eradicated through the use of gene hunting. The more knowledge possessed on genes of livestock can help to develop disease resistant animals and produce better management practices.

Identifying useful genes means that certain breeds may be selectively bred. For instance, a gene that produces a high milk yield in cows or a gene that is resistant to particular diseases found in a specific breed. The 'useful gene' can then be used and inserted into other breeds in the hope of taking up that gene. Identifying and mapping out genes and finding out their functions is useful in better productivity and herd management. It can help scientist understand why certain problems arise and how to potentially deal with them. Through understanding the genes, an animals needs can be met easier.

Therefore, hunting for specific ~~[illegible]~~ genes can improve knowledge and welfare of 'livestock breeds.

This is an of what was seen more often, a very generic discussion of selective breeding.


By gene hunting, the best traits are picked out and they are bred together, this ensure there is a chance that both traits are displayed and certain livestock breeds are sold more because of the good genes they are born with. This could include fast growth rates, docile temperements, and healthy genetics. This ensures that the less successful breeds have a chance to be bred with others and are born with multiples genes that farmers want.

(b) Discuss the ethical issues and regulation of genetically modified animals for the food industry.

Many responses discussed the problems associated with intensive farming generally, justifying it by saying all genetically modified animals are intensively farmed. Few learners understood that genetic modification is a scientific process and not just selective breeding. Even fewer learners were aware of any legislation other than the five needs and the animal welfare legislation. This is section C12 in the specification, many learners did not seem familiar with the entire section. Very few learners recognised that genetic modified animals do not enter the human food chain in this country.

Below is an example of one of the better responses seen, though the legislation is not referred to well.

Turkeys are primarily used for meat production. To achieve the levels needed for supply and demand, turkeys are genetically modified, giving them characteristics that are not typical. Some breeds are completely manufactured for domestic and farming purposes, that would not be possible without human influence. Such is, turkeys grow to abnormally large sizes, impacting on their welfare and general wellbeing in life. Characteristics can involve an abnormal amount of weight which is excessive - this causes immobility as they cannot get up and walk around. Behaviour is stifled. Normal expression of behaviour is also stifled, as turkeys are natural foragers, and can also mate independently. Due to their enhanced weight, toms are unable to mount the hens, or what's more, - crushing the hen in the process of attempting to do so. Pressure on internal organs also occurs due to this factor and many die

painfully and prematurely.
In the wild (and as normal mating behaviour) male turkeys will often ward off any competitors by means of fighting. When placed in farming environments, space can become limited. The beaks of turkeys are cut and trimmed down to bluntness and their toes may be "cut off" to prevent injuries. This can be heightened in genetically ~~AV~~ modified turkeys as many are unable to fly or run due to carrying extra weight.
Regulations may involve exactly what goes into the animal as they will later enter the food chain.
Ethically, this can be complex as it invokes principles of animal welfare, e.g. the 5 welfare needs', as well as an outcry from the public where worries can accumulate. Similarly, other livestock animals are subjugated to GMO, such as overly muscular pigs & cows, and even sheep that cannot be birthed naturally.
Overall, animal welfare is compromised

Summary

- Learners should ensure that their notes are detailed, based on the information in the pre-release material and applicable to the UK.
- In the short answer questions, especially those with the command terms 'give' and 'state', learners should try to be succinct.
- Many learners write extensive answers to these gaining no more marks than the first few words of their answer have gained, which takes time away from questions requiring a more extended response.
- Conversely, learners often write single statements where 2 or 4 marks are available for explain or describe questions and then lose the opportunity to gain full marks.
- The specification and sample assessment materials (SAMs) are located on the BTEC National qualification webpage located here.

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