

ФГБОУ ВО НОВОСИБИРСКИЙ ГАУ

Кафедра ветеринарной генетики и биотехнологии

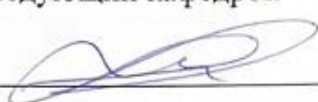
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УТВЕРЖДЁН

на заседании кафедры

Протокол от « » 2022 г. №

Заведующий кафедрой

 Вознев

**ФОНД
ОЦЕНОЧНЫХ СРЕДСТВ**

ФТД.В.01 Veterinary genetics

36.05.01 Ветеринария (Ветеринария)

Новосибирск 2022

**Паспорт
фонда оценочных средств**

№ п/п	Контролируемые разделы дисциплины	Код контролируемой компетенции (или ее части)	Наименование оценочного средства
1	Introduction	УК-4	Тест
2	Mendelian genetics	УК-4	Тест
3	Bacterial and Viral Genetic System	УК-4	Тест
4	DNA, RNA Structure and Analysis	УК-4	Тест
5	Control of gene expression in prokaryotes and eukaryotes	УК-4	Тест
6	Genomics and proteomics	ОПК-2	Тест
7	Population genetics	ОПК-2	Тест
8	Genetic and enviromental control of inherited disorders	ОПК-2	Тест, опрос
	Зачет	ОПК-2	Вопросы для зачета

ТЕКУЩИЙ КОНТРОЛЬ УСПЕВАЕМОСТИ

1.Описание оценочных средств по разделам (темам) дисциплины

Раздел 1. Introduction

Тестовое задание

1. What are some of the implications of all organisms having similar genetic systems?
 - a) That all life forms are genetically related;
 - b) That research finding on one organism's gene can often be applied to other organisms;
 - c) That genes from one organism can often exist and thrive in another organism;
 - d) All of the above;
2. Whould the horse make a good model genetic organism?
3. How did developments in cytology in the nineteenth centure contribute to our modern understanding of genetics?
4. Diploid cell have
 - a) two chromosomes;
 - b) two sets of chromosomes;
 - c) one set of chromosomes;
 - d) two pairs of homologous chromosomes.
5. Which is correct order of stages in the cycle?
 - a) G₁, S, prophase, metaphase, anaphase;
 - b) S, G₁, prophase, metaphase, anaphase;
 - c) Prophase, S, G₁, metaphase, anaphase;
 - d) S, G₁, anaphase, prophase, metaphase.

6. Which of following events takes place in meiosis II but not meiosis I

- a) Crossing over;
- b) Contraction of chromosomes;
- c) Separation of homologous chromosomes;
- d) Separation of chromatids.

7. A secondary spermatocyte has 12 chromosomes. How many chromosomes will be found in primary spermatocyte that gave rise to it?

- a) 6; b) 12; c) 18; d) 24

8. Which structure is diploid?

- a) Microspore; b) Egg; c) Megaspore; d) Microsporocyte.

Раздел 2. Mendelian Genetics.

Тестовое задание

1) The cross is $Ll \times Ll$, where l is an allele for long fingers and L is an allele for normal fingers. The probability that the child will possess the genotype for long fingers (ll) is $1/4$, or $0,25$. The trait has a penetrance of 80% which indicates that a person with genotype for long fingers has a probability of $0,8$ of actually having long fingers. The probability that the child will have long fingers is found by multiplying the probability of the genotype by the probability that a person with that genotype will express the trait: $0,25 \times 0,8 = 0,2$;

2) A 2:1 ratio is usually due to a lethal gene. The cross is $Ww \times Ww \rightarrow 1/4 WW, 1/2 Ww$, and $1/4 ww$. One of the homozygotes dies, yielding $2/3 Ww$ (green) and $1/3 ww$ (white). The green progeny are therefore heterozygous (Ww).

Раздел 3. Bacterial and Viral Genetic System

Тестовое задание

1. Which is true of plasmids?

- a) they are composed of RNA;
- b) they normally exist outside of bacterial cells;
- c) they possess only a single strand of DNA;
- d) they replicate independently of the bacterial chromosome.

2. Which process of DNA transfer in bacteria requires a virus?

- a) conjugation;
- b) transduction;
- c) transformation;
- d) all of the above.

3. Conjugation between an F^+ and F^- cell usually results in?

- a) Two F^+ cells;
- b) Two F^- cells;
- c) an F^+ and an F^- cell;
- d) an Hfr cell and an F^+ cell.

4. In which bacteriophage life cycle does the phage DNA become incorporated into the bacterial chromosome?

- a) Lytic;
- b) Lysogenic;
- c) Both lytic and lysogenic;
- d) Neither lytic or lysogenic.

Раздел 4. DNA, RNA Structure and Analysis

Тестовое задание

1. What did Watson and Crick use to help solve the structure of DNA?
 - a) X-ray diffraction;
 - b) Laws of structural chemistry;
 - c) Models of DNA;
 - d) All the above.

2. How do the sugars of RNA and DNA differ?
 - a) RNA has a six-carbon sugar; DNA has a five-carbon sugar;
 - b) The sugar of RNA has a hydroxyl group that is not found in the sugar of DNA;
 - c) RNA contains uracil; DNA contain thymine;
 - d) DNA's sugar has a phosphorous atom; RNA's sugar does not.

3. The antiparallel nature of DNA refers to:
 - a) its charged phosphate groups;
 - b) the pairing of bases on one strand with bases on the other strand;
 - c) the formation of hydrogen bonds between bases from opposite strands;
 - d) the opposite direction of the two strands of nucleotides.

4. Primers are synthesized where on the lagging strand?
 - a) Only at the 5' end of the newly synthesized strand;
 - b) Only at the 3' end of the newly synthesized strand;
 - c) At the beginning of every Okazaki fragment;
 - d) At the multiple places within an Okazaki fragment.

5. What would be the result if an organism's telomerase were mutated and nonfunction?
 - a) No DNA replication would take place;
 - b) The DNA polymerase enzyme would stall at the telomere;
 - c) Chromosomes would shorten each generation;
 - d) RNA primers could not be removed.

6. Which class of RNA is correctly paired with its function?
 - a) Small nuclear RNA (snRNA): processes rRNA;
 - b) Transfer RNA (tRNA): attaches to an amino acid;
 - c) MicroRNA (miRNA): carries information for the amino acid sequence of a protein;
 - d) Ribosomal RNA (rRNA): carries out RNA interference.

7. A codon is
 - a) one of three nucleotides that encode an amino acid;
 - b) three nucleotides that encode an amino acid;
 - c) three amino acids that encode a nucleotide;
 - d) one of four bases in DNA.

8. Amino acids bind to which part of the tRNA?
 - a) anticodon; b) DHU arm; c) 3' end; d) 5' end.

9. In elongation, the creation of peptide bonds between amino acids is catalyzed by
 - a) rRNA; b) protein in the small subunit; c) protein in the large subunit; d) tRNA.

10. In a polyribosome, the polypeptides associated with which ribosomes will be the longest

- a) Those at the 5' end of mRNA;
- b) Those at the 3' end of mRNA;
- c) Those in the middle of mRNA;
- d) All polypeptides will be the same length.

11. How do amino acids in DNA-binding proteins interact with DNA?

- a) By forming covalent bonds with DNA bases;
- b) By forming hydrogen bonds with DNA bases;
- c) By forming covalent bonds with DNA sugars.

12. What is the difference between a structural gene and a regulator gene?

- a) Structural genes are transcribed into mRNA, but regulator genes aren't;
- b) Structural genes have complex structures; regulator genes have simple structures;
- c) Structural genes encode proteins that function in the structure of the cell; regulator genes carry out metabolic reactions;
- d) Structural genes encode proteins; regulator genes control the transcription of structural genes.

Раздел 5. Control of the Gene Expression in Prokaryotes and Eukaryotes

Тестовое задание

1. Which of the following changes is a transition base substitution?

- a) Adenine is replaced by thymine;
- b) Cytosine is replaced by adenine;
- c) Guanine is replaced by adenine;
- d) Three nucleotide pairs are inserted into DNA.

2. Base analogs are mutagenic because of which characteristic?

- a) They produce changes in DNA polymerase that cause it to malfunction;
- b) They distort the structure of DNA;
- c) They are similar in structure to the normal bases;
- d) They chemically modify the normal bases.

3. Mismatch repair in bacteria distinguishes between old and new strands of DNA on the basis of

- a) differences in base composition of the two strands;
- b) modification of histone proteins;
- c) base analogs on the new strand;
- d) methyl groups on the old strand.

Раздел 6. Genomics and proteomics

Тестовое задание

1. A contig is

- a) a set of molecular markers used in genetic mapping;
- b) a set of overlapping fragments that form a continuous stretch of DNA;
- c) a set of fragments generated by a restriction enzyme;
- d) a small DNA used in sequencing.

2. The Human Genome Sequencing Consortium used which approach in sequencing the human genome?

- a) Whole-genome shotgun sequencing;

- b) Map-based sequencing;
- c) A combination of whole-genome shotgun sequencing and map-based sequencing.

3. What is the difference between orthologs and paralogs?

- a) Orthologs are homologous sequences; paralogs are analogous sequences;
- b) Orthologs are more similar than paralogs;
- c) Orthologs are in the same organism, paralogs are in different organisms;
- d) Orthologs are in different organisms; paralogs are in the same organism.

4. Which is the correct order of steps in a mutagenesis screen?

- a) Positional cloning, mutagenesis, identify mutants, verify genetic basis;
- b) Mutagenesis, positional cloning, identify mutants, verify genetic basis;
- c) Mutagenesis, identify mutants, verify genetic basis, positional cloning;
- d) Identify mutants, positional cloning, mutagenesis, verify genetic basis.

5. What is the relation between genome size and gene number in prokaryotes?

6. Segmental duplications play an important role in evolution by

- a) giving rise to new genes and multigene families;
- b) keeping the number of genes in a genome constant;
- c) eliminating repetitive sequences produced by transposition;
- d) controlling the G + C content of the genome.

Раздел 7. Population genetics

Тестовое задание

1. The measurements of a distribution with a higher – will be more spread out.

- a) Mean; b) Variance; c) Standard deviation; d) Both and above.

2. In Lubbock, Texas, rainfall and temperature exhibit a significant correlation of – 0.7. Which conclusion is correct?

- a) There is usually rainfall when the temperature is high;
- b) There is usually rainfall when the temperature is low;
- c) Rainfall is equally likely when the temperature is high or low.

3. If the environmental variance (V_E) increases and all other variance components remain the same, what will the effect be?

- a) Broad-sense heritability will decrease;
- b) Broad-sense heritability will increase;
- c) Narrow-sense heritability will increase;
- d) Broad-sense heritability will increase, but narrow-sense heritability will decrease.

4. Suppose that you just learned that the narrow-sense heritability of blood pressure measured among a group of African Americans in Detroit, Michigan, is 0.40. What does this heritability tell us about genetic and environmental contributions to blood pressure?

5. The narrow-sense heritability for a trait is 0.4 and the selection differential is 0.5. What is the predicted response to selection?

6. In a herd of dairy cattle, milk yield and the percentage of butterfat exhibit a genetic correlation of – 0.38. If greater milk yield is selected in this herd, what will be the effect on the percentage of butterfat?

7. Which statement is not an assumption of Hardy-Weinberg law?
- The allelic frequencies (p and q);
 - The population is randomly mating;
 - The population is large;
 - Natural selection has no effect.
8. What is expected frequency of heterozygotes in population with allelic frequencies x and y is in Hardy-Weinberg equilibrium?
- $x+y$;
 - xy ;
 - $2xy$;
 - $(x - y)^2$.
9. In cats, all-white color is dominant over not all-white. In a population of 100 cats, 19 are all-white cats. Assuming that the population is in Hardy-Weinberg equilibrium, what is the frequency of the all-white allele in this population?
10. What is the effect of outcrossing on a population?
- Allelic frequencies change;
 - There will be more heterozygotes than predicted by the Hardy-Weinberg law;
 - There will be fewer heterozygotes than predicted by Hardy-Weinberg law.
 - Genotypic frequency will equal those predicted by the Hardy-Weinberg law.
11. What will be the equilibrium frequency of an allele if its forward and reverse mutation rates are 0.6×10^{-6} and 0.2×10^{-6} , respectively. Assume that no other evolutionary forces are present.
- 0,80 ;
 - 0,75;
 - 0,25;
 - 0,12.
12. Each generation, 10 random individuals migrate from population A to population B. What will happen to allelic frequency q as a result of migration when q is equal in populations A and B?
- q in A will decrease;
 - q in B will increase;
 - q will not change in either A or B;
 - q in B will become q^2 .
13. The average numbers of offspring produced by three genotypes are: $GG = 6$; $Gg = 3$; $gg = 2$. What is the fitness of Gg ?
- 3;
 - 0,5;
 - 0,3;
 - 0,27.

Раздел 8. Genetic and environmental control of inherited disorders

Тестовое задание

- Which statement is true of the neutral-mutation hypothesis?
- What are some of the advantages of using microsatellites for evolutionary studies?
- Which statement is example of postzygotic reproductive isolation?
 - Sperm of species A dies in the oviduct of species B before fertilization can take place;
 - Hybrid zygotes between species A and B are spontaneously aborted early in development;
 - The mating seasons of species A and B do not overlap;
 - Males of species A are not attracted to the pheromones produced by the female of species B.

4. In general, which types of sequences are expected to exhibit the slowest evolutionary change?

- a) Synonymous change in amino acid coding regions of exon;
- b) Nonsynonymous change in amino acid coding regions of exon;
- c) Introns;
- d) Pseudogenes.

Критерии оценки результатов тестирования:

– оценка «отлично» выставляется студенту, если процент правильных ответов составляет 80-100%;

– оценка «хорошо» – 70-79%;

– оценка «удовлетворительно» – 60-69%;

– оценка «неудовлетворительно» – менее 60%.

ПРОМЕЖУТОЧНАЯ АТТЕСТАЦИЯ

Вопросы к зачету

1. What is genetics?
2. What molecules combine to form a nucleotide
3. What is the difference between transcription and translation?
4. What is a veterinary genetics?
5. What are the principal differences between prokaryotic and eukaryotic cells?
6. What type of cells are haploid? What types of cells are diploid?
7. Does crossing over before or after chromosome duplication in cells going through meiosis?
8. Which typically last longer, interphase or M phase?
9. In human being, the gene for β -globin is located on chromosome 11, and the gene for α -globin, which is component of the hemoglobin protein, is located on chromosome 16. Would these two chromosomes be expected to pair with each other during meiosis? Explain your answer.
10. What is a monohybrid cross? What is a dihybrid cross?
11. What is principle of dominance?
12. What is the principle of segregation?
13. What is the principle of independent assortment (segregate)?
14. How many different kinds of F_1 genotypes and F_2 phenotypes would be expected from the following crosses: $AA \times aa$; $Aa \times Aa$; $Aabb \times aaBB$?
15. In a family of children, what is the chance that at three are girls?
16. What blood types could be in a children born to a woman who has blood type N and man who has blood type N/N?
17. What phenotypes and ratios are expected from the following matings: $I^A I^A \times ii$; $I^A I^B \times ii$; $I^A i \times I^B i$; $I^A I^B \times I^A I^B$?

18. In shorthorn cattle, the heterozygous condition of the alleles for red color (C^R) and white coat color (C^W) is roan (чалый) coat color. How many different kinds of gametes, genotypes and phenotypes would be expected from the roan cattle?
19. In poultry, the dominant alleles for rose comb (P), if present together, give walnut comb. The recessive alleles of each gene, when present together in homozygous state (rrpp), give single comb. What will be the comb character of the offspring of the following crosses: R/RPP x rrPp; RrPp x rrpp; rrPP x RRpp?
20. What are the genetic differences between male- and female- determining sperm in animals with heterogametic males?
21. What are sexual phenotypes of the following genotypes in Drosophila: XX, XY, XXX, XXY, XO?
22. How do the chromosomal mechanisms of sex determination differ between cattle and Drosophila?
23. Color blindness is determined by an X-linked recessive gene. A man who has normal color vision has children with a woman whose father had color blindness. What are the genotypes of the man and woman? What proportion of the children will have color blindness?
24. What is epistasis?
25. Labrador retrievers may be black (B-E-), brown (BBE-) and golden (--ee) in color. What genotypes would be expected from the following crosses: black x black (9/16 black : 4/16 golden : 3/16 brown); black x golden (2/4 golden : 1/4 black : 1/4 brown)?
26. Genes A and B are linked with 10 percent recombination. What would be the phenotypes and the probability of each, among progeny of the following cross: aB/Ab x ab/ab?
27. How do bacteria differ from the viruses?
28. What are chromosome mutations?
29. For a species with a diploid number of 20, indicate how many chromosomes will be present in the somatic nuclei of individuals that are haploid, triploid, tetraploid, trisomic and monosomic?
30. What are the differences between DNA and RNA?
31. What is transcription and RNA processing?
32. What is the central dogma of molecular genetics?
33. What is the genetic code? Why is the genetic code a triplet code instead of a singlet or doublet code? How many different amino acids are specified by the genetic code?
34. What is a genome?
35. What is a transposable genetic element?
36. Distinguish between a genetic map, a cytogenetic map and a physical map.

37. Bioinformatics is the science of gathering, manipulation, storing retrieving and classifying of genetic and other biological information use computer and statistical techniques.
38. How are transgenic and other animals produced?
39. What is a immune sistem?
40. What are antibodies and how do they protect you from viruses, bacteria and other pathogens?
41. What are primary and secondary immune responses?
42. What class of immunoglobulin do you know?
43. The genes of the MHC locus of human and animals are said to be higly polymorphic. What does this mean of what significance in this fields of medicine and veterinary?
44. Mitosis and meiosis.
45. Hereditary diseases.
46. Diseases with hereditary predisposition.
47. Autoimmune diseases.
48. Cell cycle.
49. Chromosome map.
50. Quantative in heritance.
51. Genome of bacteriaes.
52. Histocompatibility complex: BoLA, SLA.
53. Karyotypes in different species.

Критерии оценки зачета:

– «зачтено» выставляется студенту, который твердо усвоил программный материал, грамотно и по существу, без существенных неточностей отвечает на вопросы, владеет необходимыми навыками и приемами выполнения практических заданий.

– «незачтено» выставляется студенту, который не знает значительной части программного материала, допускает принципиальные ошибки, неуверенно, с большими затруднениями выполняет практические задания.

ЗАДАНИЯ
ДЛЯ ОЦЕНКИ УРОВНЯ СФОРМИРОВАННОСТИ КОМПЕТЕНЦИИ
Задания для оценки сформированности компетенции «УК-4»

Задания закрытого типа:

1. Which is correct order of stages in the cycle?

- a) G₁, S, prophase, metaphase, anaphase;
- b) S, G₁, prophase, metaphase, anaphase;
- c) Prophase, S, G₁, metaphase, anaphase;
- d) S, G₁, anaphase, prophase, metaphase.

Ответ: a

2. Name the substances predominantly secreted in chromosomes:

- a) fats;
- b) carbohydrates;
- c) proteins histones;
- d) nucleic acids.

Ответ: d

3. In the S-period of the interphase, the following processes occur:

- a) compaction of chromosomes;
- b) replication (synthesis) of DNA;
- c) separation of chromosomes;
- d) energy storage.

Ответ: b

4. In the G₂ period of the interphase, the following processes occur:

- a) compaction of chromosomes;
- b) replication (synthesis) of DNA;
- c) separation of chromosomes;
- d) energy storage.

Ответ: d

5. Direct division of somatic cells - by constriction is called:

- a) mitosis;
- b) amitosis;
- c) endomitosis;
- d) polythenia.

Ответ: b

Задания открытого типа:

1. What is mitosis?

Ответ: indirect cell division, the most common method of reproduction of eukaryotic cells.

2. What is meiosis?

Ответ: division of the nucleus of a eukaryotic cell with a halving of the number of chromosomes.

3. The reaction rate is?

Ответ: limits of the body's reaction to the variability of external conditions.

4. What are the stages in the cell cycle?

Ответ: G₁, S, prophase, metaphase, anaphase

5. What is crossover?

Ответ: the process of exchanging sections of homologous chromosomes during conjugation in the prophase of the first division of meiosis, which occurs, for example, during the formation of gametes or spores.

ЗАДАНИЯ
ДЛЯ ОЦЕНКИ УРОВНЯ СФОРМИРОВАННОСТИ КОМПЕТЕНЦИИ
Задания для оценки сформированности компетенции «ОПК-2»

Задания закрытого типа:

1. Mitosis includes the following stages:

- a) metaphase;
- b) interphase;
- c) prophase;
- d) G1-period.

Ответ: c

2. Leads to an increase in the number of chromosomes:

- a) endomitosis;
- b) amitosis;
- c) meiosis;
- d) K-mitosis.

Ответ: a, d

3. Graphic image of a karyotype is:

- a) idiogram;
- b) histogram;
- c) karyogram;
- d) metaphase plate.

Ответ: a

4. In the anaphase of mitosis, the cells diverge to the poles:

- a) homologous chromosomes;
- b) chromatids;
- c) bivalents;
- d) univalents.

Ответ: b

5. Almost all somatic cells of organisms without chromosomal abnormalities contain:

- a) diploid number of chromosomes;
- b) haploid number of chromosomes;
- c) diploid- haploid number of chromosomes;
- d) triploid number of chromosomes.

Ответ: a

Задания открытого типа:

1. Chromosomal rearrangements are predominantly caused by:

Ответ: ionizing radiation

2. The law of homologous series in hereditary variability N.I. Vavilov is as follows:

Ответ: genetically close species and genera are characterized by identical series of hereditary variability

3. What is reparation?

Ответ: repair of damaged DNA strand

4. The effect of the position of a gene is:

Ответ: change in the manifestation of the gene during its movement in the case of chromosomal rearrangement.

5. What is autopolyploidy?

Ответ: multiple increase in the number of chromosomes;

МАТРИЦА СООТВЕТСТВИЯ КРИТЕРИЕВ ОЦЕНКИ УРОВНЮ СФОРМИРОВАННОСТИ КОМПЕТЕНЦИЙ

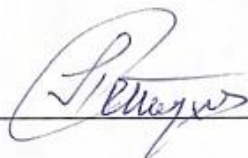
Критерии оценки	Уровень сформированности компетенций
Оценка по пятибалльной системе	
«Отлично»	«Высокий уровень»
«Хорошо»	«Повышенный уровень»
«Удовлетворительно»	«Пороговый уровень»
«Неудовлетворительно»	«Не достаточный»
Оценка по системе «зачет – незачет»	
«Зачтено»	«Достаточный»
«Не зачтено»	«Не достаточный»

Методические материалы, определяющие процедуру оценивания знаний, умений, навыков и (или) опыта деятельности, характеризующих этапы формирования компетенций

1. Положение «О балльно-рейтинговой системе аттестации студентов»: СМК ПНД 08-01-2022, введено приказом от 28.09.2011 №371-О (<http://nsau.edu.ru/file/403>; режим доступа свободный);

2. Положение «О проведении текущего контроля и промежуточной аттестации обучающихся в ФГБОУ ВО Новосибирский ГАУ»: СМК ПНД 77-01-2022, введено в действие приказом от 03.08.2015 №268а-О (<http://nsau.edu.ru/file/104821>; режим доступа свободный);

Составитель _____



(подпись)

В.Л. Петухов