# Agriculture Review

## Animal Science (Animal Breeding & Genetics) Review

**1. Who is recognized as the father of modern genetics due to his foundational work with pea plants?**

A. Charles Darwin
B. Gregor Mendel
C. James Watson
D. Louis Pasteur

**2. What is the basic physical and functional unit of heredity?**

A. Chromosome
B. Gene
C. Protein
D. Nucleus

**3. What term refers to the alternative forms of a single gene that occupy the same locus on homologous chromosomes?**

A. Chromatids
B. Alleles
C. Genomes
D. Autosomes

**4. The exact genetic constitution or makeup of an individual organism is referred to as its:**

A. Phenotype
B. Karyotype
C. Genotype
D. Somatotype

**5. The observable physical or biochemical characteristics of an organism, as determined by both genetic makeup and environmental influences, is called the:**

A. Phenotype

B. Genotype

C. Dominance

D. Pedigree

**6. When an animal possesses two identical alleles for a specific trait (e.g., BB or bb), its genetic state is described as:**

A. Heterozygous

B. Hemizygous

C. Homozygous

D. Dizygous

**7. Which breeding system involves the mating of animals that are more closely related than the average of the breed or population?**

A. Crossbreeding

B. Outcrossing

C. Inbreeding

D. Grading up

**8. The mating of unrelated animals within the same breed is known as:**

A. Linebreeding

B. Outcrossing

C. Crossbreeding

D. Species hybridization

**9. The breeding practice of mating animals from two different established breeds is called:**

A. Inbreeding

B. Linebreeding

C. Crossbreeding

D. Purebreeding

**10. What refers to the biological phenomenon where crossbred offspring exhibit superiority in performance compared to the average of their purebred parents?**

A. Inbreeding depression

B. Heterosis

C. Pleiotropy

D. Epistasis

**11. A decline in the overall performance, vigor, and fertility of animals due to the continuous mating of closely related individuals is known as:**

A. Inbreeding depression

B. Hybrid vigor

C. Genetic drift

D. Mutation

**12. Traits that are categorically distinct, controlled by one or a few gene pairs, and minimally affected by the environment (e.g., coat color or presence of horns) are called:**

A. Quantitative traits

B. Qualitative traits

C. Polygenic traits

D. Continuous traits

**13. Traits that exhibit a continuous range of variation, are controlled by many genes, and are significantly influenced by environmental factors (e.g., milk yield or weaning weight) are known as:**

A. Qualitative traits

B. Simple traits

C. Mendelian traits

D. Quantitative traits

**14. The proportion of total phenotypic variation in a population that is attributable to genetic variation is called:**

A. Repeatability

B. Heritability

C. Heterosis

D. Selection differential

**15. An allele that expresses its phenotypic effect even when heterozygous with a recessive allele is termed:**

A. Dominant

B. Recessive

C. Codominant

D. Lethal

**16. An allele whose phenotypic expression is masked when a dominant allele is present is termed:**

A. Dominant

B. Recessive

C. Epistatic

D. Additive

**17. The specific physical location or position of a gene on a chromosome is called its:**

A. Centromere

B. Telomere

C. Locus

D. Chiasma

**18. A mating designed to determine the unknown genotype of an individual displaying a dominant phenotype by crossing it with a homozygous recessive individual is a:**

A. Back cross

B. Outcross

C. Test cross

D. Reciprocal cross

**19. A simple graphical method used to predict the possible genotypic and phenotypic frequencies of offspring from a specific genetic cross is the:**

A. Pedigree chart

B. Punnett square

C. Bell curve

D. Karyotype diagram

**20. What is the general term for the mating of animals that are less closely related than the average of the population from which they came?**

A. Inbreeding

B. Linebreeding

C. Outbreeding

D. Intrabreeding

**21. The specialized type of cell division that reduces the chromosome number by half and results in the formation of gametes (sperm and egg) is:**

A. Mitosis

B. Meiosis

C. Binary fission

D. Budding

**22. The process of somatic cell division that results in two daughter cells with identical chromosome numbers and genetic makeup as the parent cell is:**

A. Meiosis

B. Apoptosis

C. Mitosis

D. Synapsis

**23. A mild form of inbreeding that aims to maintain a high degree of genetic relationship to a highly regarded, outstanding ancestor is known as:**

A. Close breeding

B. Linebreeding

C. Crossbreeding

D. Outcrossing

**24. The genetic interaction where the expression of one gene modifies or masks the expression of another gene located at a different locus is called:**

A. Pleiotropy

B. Dominance

C. Epistasis

D. Linkage

**25. When a single gene has an effect on multiple, seemingly unrelated phenotypic traits, the phenomenon is termed:**

A. Epistasis

B. Pleiotropy

C. Polygeny

D. Multiple alleles

**26. In most mammalian species (including cattle, swine, and sheep), the sex chromosomes for a normal female are:**

A. XY

B. ZW

C. XX

D. ZZ

**27. In poultry and other avian species, the sex chromosomes for a normal male are:**

A. XX

B. XY

C. ZW

D. ZZ

**28. Traits that are controlled by genes located on autosomes but are only phenotypically expressed in one sex (such as milk production or egg laying) are:**

A. Sex-linked traits

B. Sex-limited traits

C. Sex-influenced traits

D. Holandric traits

**29. Traits whose governing genes are physically located on the sex chromosomes (usually the X or Z chromosome) are known as:**

A. Sex-linked traits

B. Sex-limited traits

C. Sex-influenced traits

D. Autosomal traits

**30. The systematic process of allowing certain animals to reproduce more than others, thereby determining which individuals become parents of the next generation, is:**

A. Mutation

B. Selection

C. Migration

D. Genetic drift

**31. The numerical difference between the average performance of the selected breeding individuals and the average performance of the population from which they were chosen is the:**

A. Heritability estimate

B. Selection differential

C. Generation interval

D. Breeding value

**32. An animal that possesses two different alleles for a specific genetic trait (e.g., Bb) is described as:**

A. Homozygous

B. Heterozygous

C. Hemizygous

D. Autosomal

**33. Which molecule serves as the primary carrier of genetic information in nearly all living organisms?**

A. RNA

B. Protein

C. DNA

D. Carbohydrate

**34. The biological process by which a specific segment of DNA is copied into a complementary strand of messenger RNA (mRNA) is known as:**

A. Translation

B. Transcription

C. Replication

D. Transduction

**35. The cellular process where ribosomes synthesize proteins using the genetic sequence carried by mRNA is called:**

A. Transcription

B. Replication

C. Translation

D. Mutation

**36. If a homozygous polled (hornless) bull (PP) is mated to a homozygous horned cow (pp), and the polled trait is completely dominant, what is the expected phenotype of the offspring?**

A. 100% Horned

B. 50% Polled, 50% Horned

C. 100% Polled

D. 75% Polled, 25% Horned

**37. In a monohybrid cross between two heterozygous animals (Bb x Bb) for a trait with complete dominance, what is the expected phenotypic ratio of their offspring?**

A. 1:2:1

B. 3:1

C. 9:3:3:1

D. 1:1

**38. Among the following categories of livestock traits, which generally exhibits the lowest heritability (usually < 0.20)?**

A. Carcass traits (e.g., ribeye area)

B. Growth traits (e.g., yearling weight)

C. Productive traits (e.g., milk yield)

D. Reproductive traits (e.g., litter size)

**39. Carcass traits such as backfat thickness or loin eye area generally fall into which classification of heritability?**

A. Low heritability

B. Moderate heritability

C. High heritability

D. Zero heritability

**40. Which breeding strategy utilizes the specific strengths of different breeds (breed complementarity) and maximizes heterosis in the market offspring, where all offspring are sold and none are kept for replacements?**

A. Rotational crossbreeding

B. Purebreeding

C. Terminal crossbreeding

D. Inbreeding

**41. According to the genetic progress equation, the expected genetic change per year can be accelerated by doing which of the following?**

A. Decreasing the selection differential

B. Decreasing the generation interval

C. Lowering the heritability of the trait

D. Increasing the generation interval

**42. In some genetic interactions, the heterozygous phenotype is a distinct intermediate blend between the two homozygous phenotypes. This phenomenon is known as:**

A. Complete dominance

B. Codominance

C. Overdominance

D. Incomplete dominance

**43. In Shorthorn cattle, mating a red coat animal (RR) with a white coat animal (WW) produces offspring with a roan coat (RW), where both red and white hairs are simultaneously and distinctly expressed. This is an example of:**

A. Incomplete dominance

B. Codominance

C. Epistasis

D. Sex-linked inheritance

**44. A swine breeder is selecting for weaning weight. If the heritability of weaning weight is 0.30 and the selection differential (the superiority of selected parents over the herd average) is 10 kg, what is the expected genetic progress per generation?**

A. 3.0 kg

B. 7.0 kg

C. 10.0 kg

D. 33.3 kg

**45. The extreme form of heterosis where the heterozygous individual is superior in performance not just to the parental average, but to both of the homozygous parental lines, is scientifically termed:**

A. Codominance

B. Overdominance

C. Incomplete dominance

D. Epistasis

**46. Outcrossing is a common practice utilized by purebred livestock breeders primarily to:**

A. Create a new composite breed

B. Increase the frequency of homozygous recessive lethal genes

C. Introduce new genetic material and prevent severe inbreeding depression

D. Ensure all offspring have identical genotypes

**47. Traits that demonstrate a continuous distribution of phenotypes within a population, typically plotting as a bell-shaped normal distribution curve, are highly characteristic of:**

A. Monogenic traits

B. Qualitative traits

C. Mendelian traits

D. Quantitative traits

**48. If an animal breeder wishes to make rapid genetic improvement on a highly heritable trait (e.g., backfat thickness in swine), which method of selection is most efficient and directly applicable?**

A. Pedigree selection

B. Progeny testing

C. Family selection

D. Mass (Individual) selection

**49. In a random mating population that is in Hardy-Weinberg equilibrium, the frequency of individuals expressing the recessive phenotype is observed to be 0.16. What is the calculated frequency of the dominant allele (p) in this population?**

A. 0.16

B. 0.40

C. 0.60

D. 0.84

**50. A dairy farmer utilizes a sire with a known Breeding Value (BV) for milk yield of +500 lbs. He mates this sire to a cow with a Breeding Value of +300 lbs for milk yield. Assuming no other factors, what is the expected Breeding Value of the resulting offspring?**

A. 150 lbs

B. 250 lbs

C. 400 lbs

D. 800 lbs

# Verified Answer Key

| | | | | |
|---|---|---|---|---|
| Q1. B | Q2. B | Q3. B | Q4. C | Q5. A |
| Q6. C | Q7. C | Q8. B | Q9. C | Q10. B |
| Q11. A | Q12. B | Q13. D | Q14. B | Q15. A |
| Q16. B | Q17. C | Q18. C | Q19. B | Q20. C |
| Q21. B | Q22. C | Q23. B | Q24. C | Q25. B |
| Q26. C | Q27. D | Q28. B | Q29. A | Q30. B |
| Q31. B | Q32. B | Q33. C | Q34. B | Q35. C |
| Q36. C | Q37. B | Q38. D | Q39. C | Q40. C |
| Q41. B | Q42. D | Q43. B | Q44. A | Q45. B |
| Q46. C | Q47. D | Q48. D | Q49. C | Q50. C |