Student's Name _____ **ZOOLOGY/SCIENCE OF ANIMAL REPRODUCTION AG 0534**

Directions:	Evaluate the trainee using the rating scale below and check the appropriate number to indicate the degree of competency achieved. The numerical ratings of 3, 2, 1, and 0 are not intended to represent the traditional school grading system of A, B, C, D, and F. The descriptions associated with each of the numbers focus on level of student performance for each of the tasks listed below.
Rating Scale:	**0 - No Exposure** - no information nor practice provided during training program, complete training required. **1 - Exposure Only** - general information provided with no practice time, close supervision needed and additional training required. **2 - Moderately Skilled** - has performed independently during training program, limited additional training may be required. **3 - Skilled** - can perform independently with no additional training.

1. Number of Competencies Evaluated _____
2. Number of Competencies Rated 2 or 3 _____
3. Percent of Competencies Attained (2/1) _____

_____
Grade

_____ _____
Instructor Signature Date

01.0 The Organisms
The student will be able to:

0 1 2 3		
☐☐☐☐	01.01	Outline the classification system used to identify organisms
☐☐☐☐	01.02	List the five kingdoms and describe the unique characteristics of the individuals within each kingdom
☐☐☐☐	01.03	Explain the concept: the more closely organisms are related the more similar their classification will be
☐☐☐☐	01.04	Outline the classification of the major livestock animals in the United States

02.0 Cell Structure
The student will be able to:

0 1 2 3		
☐☐☐☐	02.01	Identify the parts and organelles of the plant and animal cells
☐☐☐☐	02.02	Describe the differences between plant and animal cells
☐☐☐☐	02.03	List and describe the functions of each of the major types of specialized animal cells
☐☐☐☐	02.04	Describe the functions of the vacuole, microtubules, and microfilaments as they relate to the cell structure and support
☐☐☐☐	02.05	Explain how a cell is able to maintain a particular shape, and the nutrients that help it do so

03.0 Functions of the Cell
The student will be able to:

0 1 2 3		
☐☐☐☐	03.01	List and describe the nutrient and elemental composition of the cells protoplasm
☐☐☐☐	03.02	List the cell organelles and the functions of each part
☐☐☐☐	03.03	Trace the pathway of a glucose molecule through the cell
☐☐☐☐	03.04	Describe the process of cellular metabolism of proteins, fats, and complex carbohydrates
☐☐☐☐	03.05	Describe the process of cellular respiration and list the products formed by it

04.0 Animal Tissues
The student will be able to:

0 1 2 3		
☐☐☐☐	04.01	Describe how specialized cells are organized to form a tissue type
☐☐☐☐	04.02	List and describe the six types of specialized animal tissues and their individual functions

05.0 Animal Organs and Systems
The student will be able to:

0 1 2 3		
☐☐☐☐	05.01	List the eight systems of animals and the major organs that make up each system
☐☐☐☐	05.02	Explain the functions of each of the eight systems listed above

06.0 Genetics and Heredity

The student will be able to:

0 1 2 3

☐☐☐☐ 06.01 Describe mitosis and meiosis

☐☐☐☐ 06.02 Explain why genes are important in animal breeding

☐☐☐☐ 06.03 List and describe, the two ways in which genes control inherited traits

☐☐☐☐ 06.04 Define the following terms:

a. Dominant gene
b. Recessive gene
c Homozygous gene pairs
d. Heterozygous gene pairs

☐☐☐☐ 06.05 Demonstrate the use of the pungent square to predict the traits of the offspring when the male and female carry heterozygous gene pairs of a given trait

☐☐☐☐ 06.06 Define and give an example of incomplete dominance

☐☐☐☐ 06.07 Explain how the sex of the offspring is determined in mammals and poultry

☐☐☐☐ 06.08 Define and give an example of sex linked characteristics

☐☐☐☐ 06.09 Explain linkage, crossover, and mutation

☐☐☐☐ 06.10 Explain a heritability estimate and how it is used to improve livestock through breeding

☐☐☐☐ 06.11 List the pairs of chromosomes for each of the various species of livestock

07.0 Macroscopic Male Functional Anatomy

The student will be able to:

0 1 2 3

☐☐☐☐ 07.01 Identify and relate the gross anatomical structures of the male reproductive system

☐☐☐☐ 07.02 Describe the function of the parts of the male reproductive system

☐☐☐☐ 07.03 Differentiate reproductive structures of the bull, ram, boar, and stallion

☐☐☐☐ 07.04 Trace a spermatozoan in the male reproductive tract

☐☐☐☐ 07.05 Explain why temperature is so critical to the testes and what three structures regulate it

☐☐☐☐ 07.06 Define monorchid and explain how it may be determined

☐☐☐☐ 07.07 Explain the cause of a scrotal hernia

☐☐☐☐ 07.08 Indicate where sperm is mixed with the accessory fluids first to become semen

☐☐☐☐ 07.09 Diagram and label how the parts of penis of the bull differs from that of the stallion in cross section

08.0 Microscopic Anatomy of Spermatogenesis

The student will be able to:

0 1 2 3

☐☐☐☐ 08.01 Distinguish reproductive organs by cell type

☐☐☐☐ 08.02 Indicate the function of an organ to the cell types present

☐☐☐☐ 08.03 Diagram spermatogenesis from its beginning to the mature spermatozoan

☐☐☐☐ 08.04 Explain the major purpose of the ciliated columnar epithelial cells, and indicate where they are found in the male reproductive tract

☐☐☐☐ 08.05 Define the following terms:

a. tunica
b. corpus
c. recti
d. albuginea
c. parietal
f. spermatocytogenesis
g. efferent
h. sustentacular

☐☐☐☐ 08.06 Describe the function of the sustentacular cells

☐☐☐☐ 08.07 Indicate from what does the helical portion of the midpiece of the sperm form

☐☐☐☐ 08.08 Indicate at what point of sperm progression through the tract does forward motion occur

☐☐☐☐ 08.09 Identify the primary cells found in the seminiferous tubules

☐☐☐☐ 08.10 Indicate how many spermatozoa form from a single primary spermatocyte in livestock species

☐☐☐☐ 08.11 Indicate the amount of time spermatogenesis takes in the bull

☐☐☐☐ 08.12 Explain the effect of infection of a cut on the scrotum of a bull and resulting reproductive response

09.0 Hormones and Puberty In the Male

The student will be able to:

0 1 2 3

☐☐☐☐ 09.01 Identify the major hormones of reproduction and their actions

☐☐☐☐ 09.02 Distinguish between releasing hormones, hypophyseal, and gonadal hormones

☐☐☐☐ 09.03 Relate action to specific male hormones and their sources

☐☐☐☐ 09.04 Explain the factors affecting puberty and their interactions

☐☐☐☐ 09.05 Relate age, size and weight to puberty

☐☐☐☐ 09.06 Determine factors to be considered in selecting breeding stock

☐☐☐☐ 09.07 Define gonadotropic

0 1 2 3

☐☐☐☐ 09.08 Relate the four parts of the hypophysis to their function

☐☐☐☐ 09.09 Diagram the hormonal sequence in the male, beginning and ending with ICSHRH

☐☐☐☐ 09.10 List the effects of testosterone on secondary sex characteristics in the bull

☐☐☐☐ 09.11 Indicate the bull-to-cow ratio when using young bulls for the first time compared to mature bulls

10.0 Ejaculation and Semen Collection

The student will be able to:

0 1 2 3

☐☐☐☐ 10.01 Explain the process of mating

☐☐☐☐ 10.02 Describe the composition of semen and the point of deposition in the female, and its composition

☐☐☐☐ 10.03 Describe the passage of sperm through the tract during ejaculation

☐☐☐☐ 10.04 List the males that have fractionated ejaculates

☐☐☐☐ 10.05 List the advantages and disadvantages of the various methods of collecting semen

☐☐☐☐ 10.06 Describe in detail the use of the artificial vagina and electroejaculator for collecting semen

11.0 Breeding Soundness Evaluation

The student will be able to:

0 1 2 3

☐☐☐☐ 11.01 Describe and explain the criteria used for evaluating the outward signs of fertility in the male and female

☐☐☐☐ 11.02 Describe how to evaluate the internal reproductive organs for breeding soundness

☐☐☐☐ 11.03 Explain the value of the various factors used in evaluating semen

☐☐☐☐ 11.04 List and describe the kinds of performance records which might be used when selecting breeding animals

☐☐☐☐ 11.05 Explain how a pedigree might be used when selecting breeding stock

☐☐☐☐ 11.06 Describe the traits that are desirable in selecting a herd sire and females for each species

12.0 Semen Production, Processing, and Storage

The student will be able to:

0 1 2 3

☐☐☐☐ 12.01 Describe the efficacy of using fresh sperm in a breeding program

☐☐☐☐ 12.02 Evaluate the various ways of processing sperm

☐☐☐☐ 12.03 List the constituents of semen extender

☐☐☐☐ 12.04 Calculate semen extension for processing fresh and frozen semen

☐☐☐☐ 12.05 List the advantages and disadvantages of the various methods of packaging semen

☐☐☐☐ 12.06 Explain which method of selecting a sire is the most effective

☐☐☐☐ 12.07 Explain what 60-90 NR means

13.0 Macroscopic Female Functional Anatomy

The student will be able to:

0 1 2 3

☐☐☐☐ 13.01 Trace the path of the ovum in the female reproductive tract

☐☐☐☐ 13.02 List the anatomical differences of the reproductive systems among the species

☐☐☐☐ 13.03 Describe the distinguishing external features of the ovaries of the cow, sow, ewe and mare

☐☐☐☐ 13.04 Identify the structures of the ovary and relate them to their functions

☐☐☐☐ 13.05 Classify the uteri of different species according to their configuration

14.0 Microscopic Female Functional Anatomy

The student will be able to:

0 1 2 3

☐☐☐☐ 14.01 Distinguish between a follicle, corpus hemorrhagicum, corpus luteum, corpus albicans, and an atretic follicle

☐☐☐☐ 14.02 List and describe the steps in follicular growth

☐☐☐☐ 14.03 Describe cell division during oogenesis

☐☐☐☐ 14.04 Describe the relationship of cell types to function in the oviduct, uterus, cervix, vagina, vestibule, and vulva

☐☐☐☐ 14.05 Indicate where the majority of the oocytes are located at birth

☐☐☐☐ 14.06 Explain how one would distinguish between a follicle and a corpus luteum by palpation in the cow

☐☐☐☐ 14.07 Indicate when the myometrium is most active

15.0 Hormones and Puberty in the Female

The student will be able to:

0 1 2 3

☐☐☐☐ 15.01 List the hormones originating in the hypothalamus, hypophysis, and the gonads that are related to female reproduction

☐☐☐☐ 15.02 Identify the various hormones with their resulting target organs

☐☐☐☐ 15.03 Describe the four factors related to puberty

☐☐☐☐ 15.04 List the ages and ranges for the onset of puberty in the various species

☐☐☐☐ 15.05 Describe the effects of hormones, genetics, nutrition, and environment on the manifestation of puberty

☐☐☐☐ 15.06 Explain why one would want to shorten the prepubertal interval

16.0 Estrus and the Estrous Cycle

The student will be able to:

0 1 2 3

☐☐☐☐ 16.01 Describe the symptoms of estrus in the various species

☐☐☐☐ 16.02 Describe the meaning for the following: proestrus, estrus, metestrus, diestrus, and anestrus

☐☐☐☐ 16.03 Diagram the hormonal pathways used to initiate the activities of the various glands and organs in the body

☐☐☐☐ 16.04 Match specific hormones to their specific responses from target organs

☐☐☐☐ 16.05 Describe the growth of ovarian structures through an estrous cycle

☐☐☐☐ 16.06 Indicate the length of the estrous cycle for each species

☐☐☐☐ 16.07 Describe when each species is most likely to be receptive to the male

☐☐☐☐ 16.08 Describe the activity of the oviduct at the time of ovulation

☐☐☐☐ 16.09 Explain how the menstrual cycle differs from the estrous cycle

17.0 Ovulation Control

The student will be able to:

0 1 2 3

☐☐☐☐ 17.01 List the advantages and disadvantages of ovulation control

☐☐☐☐ 17.02 Describe the various compounds used for ovulation control for each class of livestock

☐☐☐☐ 17.03 Distinguish between the action of progesterone, progestogens, and prostoglandins for ovulation control

☐☐☐☐ 17.04 Explain why two injections of prostoglandins are needed to control ovulation

☐☐☐☐ 17.05 Describe a general plan for breeding sheep in anestrus

0 1 2 3

☐☐☐☐ 17.06 Outline a method for increasing the number of pigs per fitter

☐☐☐☐ 17.07 Discuss the general approach to the superovulation of mares

☐☐☐☐ 17.08 Explain why one would want to breed calves before they normally reach puberty

☐☐☐☐ 17.09 Explain the difference between prostaglandin and prostaglandin analogue

☐☐☐☐ 17.10 Explain why interuturine (PGF 2 alpha a) is injected at a lower rate than intermuscular

☐☐☐☐ 17.11 List the detrimental side effects that are present in swine when synchronized with progestogens

☐☐☐☐ 17.12 Explain why it is necessary to have a functional CL before using prostaglandins

☐☐☐☐ 17.13 Describe the hormone sequence that is used to superovulate a cow

18.0 Artificial Insemination

The student will be able to:

0 1 2 3

☐☐☐☐ 18.01 List the advantages and disadvantages of artificial insemination for the various classes of livestock

☐☐☐☐ 18.02 Describe the differences between the various techniques of artificial insemination

☐☐☐☐ 18.03 List the various techniques that are used to check estrus in cattle

☐☐☐☐ 18.04 Outline an Al program and its specific management for any class of livestock

☐☐☐☐ 18.05 Describe and explain the time of insemination to optimum conception

☐☐☐☐ 18.06 Explain the A.M. - P.M. inseminating rule

☐☐☐☐ 18.07 Indicate the best temperature to thaw frozen semen to be used immediately

☐☐☐☐ 18.08 Explain why sheep artificial insemination is so poorly accepted in the U.S.

☐☐☐☐ 18.09 Describe one method of restraint for mares during insemination

19.0 Fertilization and Embryo Transfer

The student will be able to:

0 1 2 3

☐☐☐☐ 19.01 Describe the mechanisms involved in sperm and ovum transport

☐☐☐☐ 19.02 List in order the barriers to sperm penetration of the ovum

☐☐☐☐ 19.03 Discuss the advantages and disadvantages of embryo transfer, particularly for the bovine

0 1 2 3

☐☐☐☐ 19.04 Describe the importance of synchronization, condition, superovulation, and insemination to embryo transfer
☐☐☐☐ 19.05 Describe in outline form embryo transfer in any domestic species
☐☐☐☐ 19.06 Distinguish between 'good' and 'bad' eggs
☐☐☐☐ 19.07 Describe some of the problems of and need for continued research on embryo transfer
☐☐☐☐ 19.08 Explain how sperm moves so rapidly from the point of natural deposition to the point of fertilization
☐☐☐☐ 19.09 Indicate where fertilization takes place
☐☐☐☐ 19.10 Indicate how long it takes sperm to reach the point of fertilization in the cow, ewe, and sow
☐☐☐☐ 19.11 Explain where sperm is deposited in the normal copulation of the horses
☐☐☐☐ 19.12 Define syngamy
☐☐☐☐ 19.13 Explain what is so critical about the synchronization of the donor and recipient for embryo transfer
☐☐☐☐ 19.14 Explain what must be considered when inseminating the donor cow
☐☐☐☐ 19.15 Describe the nonsurgical approach to embryo transfer in the mare
☐☐☐☐ 19.16 Describe the main reason for transferring embryos in swine

20.0 Biotechnology

The student will be able to:

0 1 2 3

☐☐☐☐ 20.01 Explain biotechnology
☐☐☐☐ 20.02 Discuss the use of genetic engineering in agriculture
☐☐☐☐ 20.03 List and describe 5 current genetic activities that have the potential to have a major impact on agriculture
☐☐☐☐ 20.04 Discuss the problems relating to the use of genetic engineering
☐☐☐☐ 20.05 Explain Recombinant DNA technology
☐☐☐☐ 20.06 List the possible effects of the recent patent office ruling concerning the patentability of genetic engineered animal and plant products

21.0 Gestation and Pregnancy Determination

The student will be able to:

0 1 2 3

☐☐☐☐ 21.01 List the gestation lengths for domestic animals
☐☐☐☐ 21.02 Describe the importance of progesterone and its source to maintenance of pregnancy
☐☐☐☐ 21.03 List the embryonic membranes of the embryo

0 1 2 3

☐☐☐☐ 21.04 List the major developments of the prenatal young
☐☐☐☐ 21.05 Describe the age to developmental periods of the embryo
☐☐☐☐ 21.06 Distinguish placentas by structure, shape, and animal in which each is found
☐☐☐☐ 21.07 List reasons for pregnancy determination and outline methods for determining pregnancy
☐☐☐☐ 21.08 List the determining characteristics for age of the fetus in the cow at different stages of development

22.0 Parturition and the Postpartum Period

The student will be able to:

0 1 2 3

☐☐☐☐ 22.01 List and describe the factors influencing parturition
☐☐☐☐ 22.02 Describe the stages of parturition as they apply to the various species
☐☐☐☐ 22.03 List the problems that may arise during birth and methods of alleviating them
☐☐☐☐ 22.04 Relate and describe the postpartum period to ensuing estrous activity and conception
☐☐☐☐ 22.05 Explain what changes occur in progesterone and estrogen at parturition in the cow, ewe, sow, mare
☐☐☐☐ 22.06 Define terms associated with parturition and the postpartum period
☐☐☐☐ 22.07 List the beginning and ending activities of the three stages of parturition in the cow
☐☐☐☐ 22.08 Define dystocia
☐☐☐☐ 22.09 Explain what should be done if the cow retains her placenta
☐☐☐☐ 22.10 List the problems involved with induced parturition in cattle
☐☐☐☐ 22.11 Indicate when it would be profitable to induce birth in cattle
☐☐☐☐ 22.12 Describe the farrowing process
☐☐☐☐ 22.13 Describe the birth process of a foal
☐☐☐☐ 22.14 Explain what 'foal heat is, and how it differs from postpartum estrus in the sow

23.0 Reproductive Diseases

The student will be able to:

0 1 2 3

☐☐☐☐ 23.01 Identify symptoms of major reproductive diseases
☐☐☐☐ 23.02 List the necessary specimens needed for diagnosing by the veterinarian or diagnostic laboratory

0 1 2 3

☐☐☐☐ 23.03 Identify those diseases transmitted by coitus only (venereal diseases)

☐☐☐☐ 23.04 Describe the importance of preventive measures and the need for the veterinarian and diagnostic laboratory

☐☐☐☐ 23.05 Indicate that specimens that are most commonly needed to diagnose the cause of an abortion

☐☐☐☐ 23.06 Indicate the hormone that may be deficient during gestation

☐☐☐☐ 23.07 Explain why torsion of the umbilical cord would cause abortion

24.0 Relationship Between Nutrition and Reproduction

The student will be able to:

0 1 2 3

☐☐☐☐ 24.01 Describe the reproductive benefits which are derived from flushing, and the rations that are needed to derive these benefits

☐☐☐☐ 24.02 Describe the reproductive problems encountered from deficient nutritional levels

☐☐☐☐ 24.03 Describe the reproductive problems that result from over feeding

☐☐☐☐ 24.04 Describe the role of minerals in the reproductive process

☐☐☐☐ 24.05 Describe how the nutrient levels required for reproduction change as each animal species proceeds through pregnancy

☐☐☐☐ 24.06 Describe the differences in nutrient requirements between growing and mature animals as related to reproductive efficiency

☐☐☐☐ 24.07 Indicate the most critical nutrient for lactating animals

☐☐☐☐ 24.08 Indicate the minimum level of fiber needed in the ration of lactating dairy cows and why is it needed

☐☐☐☐ 24.09 Describe how proper nutrition during pregnancy will prevent postpartum diseases and ailments in the offspring

☐☐☐☐ 24.10 Describe the role of antibiotics in animal rations during gestation

☐☐☐☐ 24.11 Describe how sires should be fed for best reproductive performance

☐☐☐☐ 24.12 Describe the all the nutrient requirements associated with lactation

☐☐☐☐ 24.13 Describe the importance of the calcium - phosphorous ratio to reproductive performance

☐☐☐☐ 24.14 List the recommended protein and energy requirements for pullets and hens of the egg laying species