Colorado Agriscience Curriculum

Unit 3

Anatomy and Physiology

Lesson 1

Animal Growth and Development

Periods of Growth

- There are two separate stages we are concerned with in animal growth and development.
- What two distinct stages could we separate the chicks' growth into at this point?
  - In the egg – prenatal
  - Hatched – postnatal

Periods of Growth

- Prenatal Growth
  - Growth and development prior to birth or hatching
  - Involves time between when ovum is fertilized and birth (hatch)

Periods of Growth

- Gestation
  - The time from conception following breeding until a female gives birth to her young
  - Varies among species
    - From 110-115 days in pigs
    - To 335-345 days in horses

Periods of Growth

- Postnatal Growth
  - Growth after birth
  - Not all parts of an animal's body develop at the same rate
  - Different species do not develop at the same rate

Nutrition and Growth

- Where do the chicks get the nutrients from while in the egg?
  - They live off of nutrients contained in the yolk.
- So where do animals get their nutrients from after birth or hatch?
  - An outside source.
  - Despite the complex physiological systems of higher animals, they are not able to manufacture certain nutrients essential to life

Nutrition and Growth

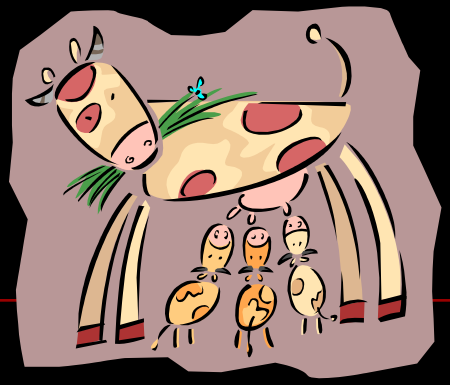
- Embryo / Fetus
  - Under the mother's care in the uterus
    - Nutritional needs of the young are carefully protected
      - Mother will often go the extent of drawing on her own body reserve to meet the needs of the developing young
    - If nutrients supplied to mother during pregnancy are severely deficient
      - Birth weight as well as vigor maybe deficient
    - Lack of vitamins and minerals
      - May have marked effect on the vigor of offspring without greatly effecting the birth weight

Slide cont.

Nutrition and Growth cont.

- Embryo / Fetus
  - Lack of vigor
    - Is usually followed by heavy death loss of newborns shortly after birth
  - Light birth weight
    - Many times light birth weight due to lacking nutrition can be offset by adequate nutrition after birth

Nutrition and Growth



- Postnatal Growth
  - Effects of poor nutrition after birth on postnatal growth depends on three factors:
    - 1. Age at which poor nutrition occurs
    - 2. Length of time during which the animal was subjected to poor nutrition
    - 3. Kind of poor nutrition the animal was subjected to…
      - Protein
      - Energy
      - Vitamins

Nutrition and Growth

- Malnutrition
  - A disorder of nutrition which is usually a state of inadequate nutrition
  - Research reports vary in their determination of whether poor nutrition during some stage of an animal's development can stunt or prevent the animal from reaching its potential mature size.
  - Severe malnutrition following birth for an extended period of time usually will prevent the animal from reaching its normal mature size.

Nutrition and Growth

- What do you think will happen once an animal that has been underfed is placed on full feed?
- Compensatory gain
  - Once an animal that has been underfed is placed on full feed, abnormally rapid gain will be experienced.

Heredity Mechanisms in Growth

- Growth is effected by hereditary influences
  - Hereditary
    - The amount of phenotypic variation (observable) that is accounted for by additive gene action
    - Evident by the fact that a single gene or group of genes control the maximum growth potential of an individual
      - Dwarfism – example of single pair of genes severely limits growth of an individual

Effects of Heredity upon Prenatal Growth

- Chickens
  - Limited by egg size
    - Because of amount of nutrients available to developing chick
- Litter bearing animals
  - Pigs / Rabbits
    - Birth weight may be effected by the size of the litter and consequently available uterine space and/or nutrients

Hereditary Effects on Growth from Birth to Weaning

- Growth during this period can be heavily effected by the amount of milk that is given by the dam.

Hereditary Effects on Post-weaning Growth

- During this period of growth, the individual's actual genetic potential for growth can be more easily evaluated
  - Provided that nutritional levels are adequate and diseases and parasites are controlled.
- The mature size of animals is directly related to the rate of gain and feed efficiency of animals.

Genetic Control of Growth Mechanisms

- Information to illustrate the physiological pathways of gene action is limited.
- Increased rate and efficiency of gain in swine due to hybrid vigor is caused by a more efficient metabolic system which is genetically controlled