Sanoanimal Equine Nutritionist
Online-Training

Please note: This overview has been translated from German. The topics and content covered in the training will remain as described below. However, please be aware that specific terminology may vary slightly in the final course materials as we continue refining the translation of all training scripts.

1. Introduction
    a. Comparison of lifestyle and nutrition: wild horse versus domestic horse
    b. Introduction to the horse's metabolism
    c. Explanations of pH value
    d. Basics of metabolic regulation
    e. Enzymes in metabolism: function, activation, disruptions of enzyme reactions
    f. Basics of digestive physiology in herbivores
2. Anatomy and Function of Mouth, Teeth, Salivary Glands, and Esophagus
    a. Anatomical structure of the horse's mouth
    b. Structure of horse teeth – from milk teeth to tooth loss in old horses
    c. Chewing process for roughage compared to concentrated feed
    d. Fundamentals of functional disorders of horse teeth
    e. Causes and consequences of dental problems
    f. Location and functions of the salivary glands
    g. Anatomy and function of the esophagus
    h. Disorders of the swallowing process, feed aspiration, esophageal obstruction
3. Anatomy and Function of the Stomach
    a. Anatomical structure of the stomach
    b. Anatomical peculiarities of the horse's stomach in comparison with other animal species
    c. Function of individual stomach sections
    d. Digestive Processes and Enzymes in the Stomach
    e. pH values in the stomach
    f. Causes of digestive disorders in the stomach
        i. Effects of roughage breaks
        ii. Effects of concentrate meals
        iii. Effects of different feed compositions
    g. Gastric ulcers: cause and development
4. Anatomy and Function of the Small Intestine
    a. Anatomical structure of the small intestine
    b. Anatomical structure of the small intestine wall
    c. Peristalsis and passage time in the small intestine
    d. pH values and emulsification in the small intestine
    e. Enzymatic digestion (hydrolysis)
        i. of fats in the small intestine
        ii. of proteins in the small intestine
        iii. of carbohydrates in the small intestine

f. Absorption of nutrients through the intestinal wall epithelium
g. Disorders of small intestine function

5. Anatomy and Function of the Large Intestine: Cecum, Colon, Rectum
    a. Special characteristics of the large intestine in horses compared to other species
    b. Digestion and absorption of nutrients and water in the large intestine
    c. Anatomical structure and location of the cecum
        i. Peristaltic movement
        ii. pH values in the cecum
        iii. Functions of cecal digestion
        iv. Disorders of cecal digestion
    d. Anatomical structure and location of the colon
        i. Peristalsis and passage time
        ii. Functions of colonic digestion
        iii. Disorders of colonic digestion
    e. Anatomy and location of the rectum
        i. Functions of rectal digestion
    f. Equine feces: consistency, pH value, composition, recognizing digestive disorders from feces
6. Microbiomes of the Digestive Tract
    a. Oral microbiome of horses
        i. Influencing factors on the oral microbiome
    b. Gastric microbiome of horses
        i. Disorders of the gastric microbiome and effects on the rest of the digestive tract
    c. Microorganisms in the small intestine
    d. Large intestinal microbiome of horses, functions, composition, pH values
        i. Evaluation of "gut flora analyses"
        ii. Influencing factors on the large intestinal microbiome
        iii. Consequences of disorders (dysbiosis) of the large intestinal microbiome
7. Anatomy and Function of the Pancreas
    a. Location and structure of the pancreas
    b. Endocrine function
        i. Regulatory mechanisms (insulin-dependent) of blood glucose at the cellular level
        ii. Regulatory mechanisms of blood glucose depending on feed
        iii. Regulatory mechanisms of blood glucose depending on breed and use
        iv. Disorders of blood glucose regulation (insulin resistance, PSSM, EMS, pseudo-EMS)
    c. Exocrine function
        i. Influence on pH value in the small intestine
        ii. Digestive enzymes for starch
        iii. Digestive enzymes for proteins
        iv. Digestive enzymes for fats

8. Anatomy and Function of the Liver
    a. Location and structure of the liver
    b. Functions of the liver
        i. Bile secretion and function
        ii. Involvement in carbohydrate metabolism
        iii. Involvement in fat metabolism
        iv. Involvement in protein metabolism
        v. Regulatory functions in hormone balance
        vi. Biotransformation / detoxification function
        vii. Storage function for blood, minerals, vitamins
        viii. Regulation of water balance
    c. Causes and effects of liver function disorders
9. Anatomy and Function of the Urinary System
    a. Location and structure of kidneys, ureters, bladder, urethra
    b. Regulatory function of the kidneys
        i. Water balance
        ii. Mineral balance
        iii. Osmotic pressure
        iv. Acid-base balance
    c. Excretory function of the kidneys
        i. Location, structure, and function of nephrons
        ii. Urine formation
10. Anatomy and Function of Transport and Storage Systems
    a. Cardiovascular system
    b. Lymphatic system
    c. Connective tissue
    d. Adipose tissue
11. Metabolic Stress / Detoxification / Excretion
    a. Causes of metabolic stress in horses
    b. Normal detoxification pathways and reactions
    c. Regulatory systems in case of disorders or overload of natural detoxification function
12. Nutrients: Fats
    a. Molecular structure
    b. Saturated and unsaturated fatty acids
    c. Functions and utilization of fats in metabolism
    d. Fats in feeds
    e. Fat requirements and supply for horses
13. Nutrients: Proteins
    a. Molecular structure
    b. Essential and non-essential amino acids
    c. Protein biosynthesis at the cellular level
    d. Functions and utilization of proteins in metabolism
    e. Proteins in feeds
    f. Protein requirements for horses according to age and use

14. Nutrients: Carbohydrates
    a. Molecular structure and function in plants
        i. Sugar types
        ii. Starch types (amylose, amylopectin, stachyose, etc.)
        iii. Fructan
        iv. Structural carbohydrates (cellulose, hemicellulose, pectin, lignin)
    b. Function of various carbohydrates in equine feeding
        i. Soluble vs. insoluble carbohydrates
        ii. Small intestine vs. large intestine digestible carbohydrates
15. Nutrients: Minerals
    a. Functions of minerals in metabolism
    b. Determination of mineral status
        i. Blood work
        ii. Hair mineral analysis
    c. Mineral deficiency symptoms in horses
    d. Mineral requirement values for horses according to age and use
    e. Natural mineral content in various feeds
    f. Organic vs. inorganic minerals
    g. Macro elements
        i. Calcium
        ii. Phosphorus
        iii. Sodium
        iv. Chlorine
        v. Potassium
        vi. Magnesium
        vii. Sulfur
    h. Trace elements
        i. Iron
        ii. Iodine
        iii. Cobalt
        iv. Copper
        v. Manganese
        vi. Selenium
        vii. Zinc
    i. Micro elements / Rare earths
16. Nutrients: Vitamins
    a. Functions of vitamins in metabolism
    b. Determination of vitamin status in horses
    c. Vitamin deficiency symptoms in horses
    d. Vitamin requirement values for horses according to age and use
    e. Natural vitamin sources
        i. Feeds
        ii. Microbiome
        iii. Metabolism

f. Fat-soluble vitamins
    i. Vitamin A (retinol)
    ii. Beta-Carotene
    iii. Vitamin D (ergo- and cholecalciferol)
    iv. Vitamin E (tocopherols)
    v. Vitamin K (phylloquinone, menaquinone, menadione)
g. Water-soluble vitamins
    i. Vitamin B1 (thiamine, aneurin)
    ii. Vitamin B2 (riboflavin)
    iii. Vitamin B3 (niacin, nicotinic acid)
    iv. Vitamin B5 (pantothenic acid)
    v. Vitamin B6 (pyridoxine)
    vi. Vitamin B12 (cyanocobalamin)
    vii. Biotin
    viii. Folic Acid
    ix. Vitamin C (ascorbic acid)

17. Nutrients: Water
    a. Body water balance
    b. Water intake, water loss
    c. Water quality in feeding
    d. Consequences of insufficient water supply
    e. Drinking systems, advantages and disadvantages
18. Nutrient Requirements, Energy Balance, Energy Metabolism
    a. Energy production at the cellular level, glycogen metabolism
    b. Citric acid cycle
    c. Respiratory chain
    d. Energy consumption of horses with different uses
    e. Energy sources in equine feeding
        i. Species-appropriate energy sources
        ii. Non-species-appropriate and "emergency" energy sources
    f. Compensation for excess energy
    g. Consequences of radical energy withdrawal ("reduction diet") and feeding breaks
19. Feed Types, Feed Science: Roughage
    a. Pasture: vegetation, management, grazing management, nutritional values
    b. Hay: production, varieties, nutrient content and analysis, microbiological quality, assessment
    c. Hay cubes, "structural chaff" and other products from permanent grassland management: evaluation as feed
    d. Straw: varieties, production, quality, assessment
    e. Green oats: production, quality, assessment
    f. Alfalfa: production, quality, assessment
    g. Sainfoin: production, quality, assessment

20. Feed Types, Feed Science: Concentrates
    a. Grain types
        i. Oats
        ii. Barley
        iii. Wheat
        iv. Rye
        v. Corn
        vi. Rice
        vii. Millet
    b. Change in digestibility depending on processing degree
    c. Mueslis, pellets, and other commercial concentrates
21. Feed Types, Feed Science: Succulent Feed
    a. Apples
    b. Bananas
    c. Pears
    d. Carrots
    e. Potatoes
    f. Beets / beetroot
    g. Beet pulp normal and demelassified
    h. Fodder beets / mangels
    i. Citrus fruits
    j. Other succulent feeds
22. Feed Types, Feed Science: Miscellaneous
    a. Dietary feeds
        i. Linseed (brown vs. golden linseed, commercial linseed products, preparation, indications)
        ii. Mash (composition, indications)
    b. Additional feed components in commercial feeds
        i. By-products of grain processing industry (bran, middlings, hulls, etc.)
        ii. By-products of dough processing industry (wafer meals, cookie meals, etc.)
        iii. By-products of brewing industry (brewer's yeast, spent grains, etc.)
        iv. By-products of fruit and vegetable processing industry (pomace, peeling residues, etc.)
        v. By-products of oil producing industry (shells, expeller, extraction meal, etc.)
        vi. Legumes and their by-products (soy, peas, etc.)
        vii. Miscellaneous (carob, Jerusalem artichoke, effective microorganisms, etc.)

23. Feed Law, Reading and Understanding Feed Declarations
    a. Fundamentals of feed law
        i. Complete feeds
        ii. Single feeds
        iii. Supplementary feeds
        iv. Mineral feeds
        v. Additives
        vi. Non-declarable ingredients
    b. Structure of feed declarations
        i. Composition
        ii. Analytical constituents and content
        iii. Additives (physiological and technological)
24. Assessing Nutritional Status, Determining Requirements, Deficiency, Excess, Composing Rations
    a. Primitive horse types and classification of modern breeds
    b. Weight calculation using standard formulas vs. horse scale
    c. Assessing nutritional status based on type
        i. Optimal nutritional status
        ii. Muscular condition
        iii. Lymphatic deposits
        iv. Fat deposits
    d. Assessing nutritional status using the BCI app
    e. Composing a feed ration for
        i. Underweight horses
        ii. Obese horses
        iii. Lymphatic horses
        iv. Normal weight leisure horses
        v. Sport horses
        vi. Lactating mares
        vii. Young horses