## D87 Examinations of the Standards of Normality (SON) and Production Standards (PS) to Best Identify Critical and Definitive Information Pertaining to Alleged Nutritional Associated Dysfunctions (NAD) in Animals

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After attending this presentation, attendees will understand how to carefully reconstruct an animal facilities Standards Of Normality (SON) and Productions Standards (PS) critical to identifying their relationship to animal death and abnormalities attributed to primarily a Nutritional Associated Dysfunction (NAD).

This presentation will impact the forensic science community by providing the key components necessary to properly investigate alleged animal nutrition-related deaths or abnormalities attributable to daily rations provided to commercially raised animals.

When the use of animal feeds in commercial livestock facilities result in abnormal PS, mortality rates and/or lower-than-expected performance and health parameters, it is important that a comprehensive animal and SON diagnosis be performed

Today's production livestock are finely tuned "food producing machines" that require a balance of nutrition, environment, health care, and management; any deficiencies or inadequacies in these areas will affect the ability of an animal to perform optimally. When investigating a manifested dysfunction in a livestock operation, proper analysis for each area—nutrition, environment, health care, and management—insures that the evaluation is as scientifically accurate and valid as the data permits.

An essential component in the evaluation of animal feed-related claims is a scientifically valid set of investigative techniques required to accurately evaluate Feed Associated Dysfunctions (FAD) and NAD in animals. As an example of the practical application of these techniques, the author will present a case study involving a large dairy and a toll manufactured nutrition product alleged to be inadequate. The testing and identification of milk fever, immune system abnormalities, death, and damages to the cows' reproductive system and milk production, will be used as the focal point in providing insight into measuring and documenting causation for the professional investigating similar situations.

Formulating dairy rations primarily involves providing specific fibers, protein, energy, vitamins, and mineral ingredients for defined maintenance, reproductive, and productions requirements. Several factors affect a cow's requirement for a specific nutrient. These factors influence feed intake, which will require changing the concentration of the nutrient in the diet to meet the cow's requirement on an amount-per-day basis. This presentation will identify common factors which influence specific nutrient needs and their importance to a comprehensive NAD investigation.

The physical condition of the animal's habitat and associated living organisms that occupy it must be considered in all forensic cases involving animals. The dynamic whole of the microenvironment that immediately influences the target animal individual or population exists as an interdependence of its members.

In microenvironments such as a dairy barn, or outdoor feeding area, the targeted individuals or populations that occupy it and their nonliving environment are inseparably related and are constantly interacting with each other. The exchange of materials between the living and non-living parts of a target animal or population are intimately involved in the determination of causation in nutrition-related animal death, illness, or abnormalities.

Modern animal nutrition forensic investigations cannot separate its observations from the complexity of the environmental realities that act singly and together. At the same time, it is recognized that the animal or targeted population in turn react upon their environment, often producing marked modifications.

Problems that occur in groups of animals are often multi-factorial in cause and the result of the interaction of several risk factors, which may be characteristic of the animals, their environment, their nutrition, and/or inciting agent. In the context of an operation such as a dairy facility, managerial causes must be analyzed and either ruled out as a causative factor or incorporated and weighted as a factor accordingly.

In order for Nutrition Associated Dysfunctions (NAD) to be properly investigated, documented, and analyzed to determine causation, reconstructing daily diets, SON, and PS is essential. This presentation will provide the basic scientific techniques needed to gather evidence to determine if feed has been formulated with sufficient allowances built in to address biochemical changes associated with disease, inflammation, trauma, malabsorption syndrome, interactions, variations in bioavailability, and stressors.

**Feed, Nutrition, Animals**

 ** Presenting Author*