106 Agriculture Residues as a Possible Sustainable Approach to Replacing Antibiotics in Animal Nutrition. Ricardo Ekmay[1], [1]*Arbiom inc.*

The last several years has seen a substantial increase in the investment and development of alternative proteins to lower the environmental footprint of animal agriculture. In addition to insects, single cell proteins (SCP), i.e. algae, bacteria, yeast, have received renewed attention due to their ability to utilize unconventional carbon feedstocks. Traditionally, conventional sugar streams such as corn syrup or molasses have been used for cultivation of SCP. However, algal and bacterial meals are looked at as potential solutions for industrial carbon waste such as carbon dioxide and methane. Yeasts have the ability to use pentose sugars that are found in lignocellulosic materials, i.e. agricultural and forestry residues. Much of the discourse surrounding these alternative protein sources has been on the environmental impact of their production, but less so on the impact of their use. In particular, the impact of single cell proteins on nutrient utilization and gastrointestinal health warrants attention. Nutritional value remains varied among SCP products and dependent on microbial strain and down-stream processes. Maintaining high protein digestibility, and reducing fermentable protein, as well as maintaining high phosphorus digestibility remains a critical nutritional and environmental strategy. Recent findings have indicated that the microbial strain and the carbon feedstock on which it is grown on may have an interactive effect on gastrointestinal health. In particular, yeast products can be characterized as generally anti-inflammatory, but cultivation on lignocellulosic residues appears to enhance these properties. Bacterial meals are known to contain pro-inflammatory components such as lipopolysaccharides and peptidoglycans, however, in some instances, they may also produce bioactive molecules that result in a net positive impact. It remains critical to evaluate alternative proteins in the context of whole animal health and consider the environmental impact of their use as well as their production.

Keywords: sustainability, alternative proteins, gastrointestinal health

189 Fundamentals, Common Mistakes, and Graduate Education in Statistics. Nick V. Serão[1], Mike D. Tokach[2], Neil Paton[3], [1]*Iowa State University,* [2]*Department of Animal Sciences & Industry, College of Agriculture, Kansas State University,* [3]*Cargill Animal Nutrition and Health*

Experimental design and statistical data analyses are fundamental components of animal science research. Proper design of experiments and adequate sampling permits testing hypotheses raised by researchers and sets the stage for collecting required data and subsequent statistical analysis. When designing experiments, researchers should respect rules of randomization of treatments to avoid statistical bias and permit proper inference to be drawn. Use of sample sizes that result in adequate statistical power to identify the hypothesized differences among factor levels of interest is key and should be driven by formal processes determining such. Best practices for data collection should be performed to obtain high quality data by reducing collection (e.g., mislabeling, improper technique) and measurement errors. With sound data, appropriate and optimal statistical methods should be used to generate valid results. The statistical method deployed should be chosen based on assumptions about residuals (e.g., normality, correlation, and homogeneity) and on the type of data (e.g., quantitative continuous or categorical). The appropriate statistical model used should also be consistent with the experimental design to validate the respective test statistics. The science of statistics is changing rapidly. With the development of high-throughput technologies, the generation of large datasets, high performance and sophisticated models and the interest in Big Data, the training of animal science graduate students in data management and rigorous statistical analyses is more important than ever. In order to meet the demands of current trends, animal science graduate students must be trained in several complex statistical and computational skills to meet the challenges imposed by these complicated, sophisticated and nuanced analytical methods. The livestock production sector will benefit from improved training, use of advanced and appropriate experimental designs, and collection and analysis of quality data in research.

Keywords: statistics, experimental design, data analysis