



## Lipids: Consistently inconsistent – Variability in commercial fats and oils

Karen Bierinckx, David Gonzalez Sanchez

Lipids are the feed ingredients with the highest energy as well as the highest cost per unit of energy. Therefore, it is key to monitor and assess conscientiously their cost per kcal, with the final goal of making the best purchasing decision and improving feed formulation accuracy. As progressively more industrial by-products become available as alternatives to lipid sources, nutritionists are often faced with an increased variation of lipid quality, which requires a more precise, both nutritional and economic evaluation. The Lipid Evaluation Test (LET) assesses in total ten different chemical characteristics in fats and oils. Three parameters define their oxidative quality: peroxide value, thiobarbituric acid value, and oil stability index. Three nutritional parameters are evaluated: the level of free fatty acids, the unsaturated:saturated ratio, and the fatty acid profile. These nutritional parameters are used to estimate the dietary energy contribution of lipids in feed for broilers through the equation empirically developed by Wiseman et al, 1991. LET also incorporates the assessment of three energy-diluting factors: moisture, impurities, and unsaponifiable compounds. Since its launch in 2014, more than 2140 lipid samples have been analyzed by the LET. Of this extensive dataset, 73% of samples are represented within five groups: soybean oil, animal fat, acid oils, sunflower oil, and poultry oil. Findings show that in almost two out of three samples, signs of oxidation are detected. Primary oxidation was noted in all samples, yet more pronounced in vegetable oils. Higher levels of secondary oxidation compounds were detected typically in processed lipids like animal fats and acid oils. Most oils and fats analyzed showed mainly oxidation in its initial phase, except sunflower oil where a more evolved oxidation was registered. LET also reveals the presence of a large variation in dietary energy values, even between identical fat sources. The inclusion of energy-diluting factors demonstrated a more excessive variation in the nutritional value of lipids. In extreme cases, even up to 100%. This study confirms that a correct estimation of the metabolizable energy content and oxidative quality of a lipid is only possible when a proper and full chemical evaluation is done. The LET therefore offers a suitable, analytical platform to gain in-depth insights into the nutritional and oxidative quality of fats and oils.