"Quantification of Nitrates and Flunixin Meglumine in Cattle Farms of Public Surface Water Sources in South Florida"

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Abstract: Anti-inflammatory drugs such as ibuprofen are known to be administered to cattle in the form of flunixin meglumine (FM). These NSAIDs do not completely metabolize and, if not housed in the muscle of the bovine (Zhao-Ying et al., 2014), they are excreted via urine and fecal matter (EMEA, 1999) to surface waters via run-off. One pharmacological company acknowledges this toxicity as Merck (2021) states that, in excess, flunixin may cause bioaccumulation in fish as well as adverse effects in users: blood intoxication, damage to the kidney, the liver, and the gastrointestinal tract.

Okeechobee County is said to have 65% of its land dedicated to pastureland (USDA NASS, 2020) and is located in one of the largest watersheds in Florida, the KOE (Kissimmee River, Lake Okeechobee, Everglades). Downstream from the KOE, water sources in Okeechobee, Lee, and Palm Beach Counties have had dangerous algal effects from excess nutrient loading (Steinman & Conklin, 2003). Flunixin meglumine found in surface waters indicate that fecal matter from the cattle industry may also be affecting plumes. Aside from those potential effects, Zhao-Ying (2014) concluded that even in trace amounts, the substance was toxic to the kidneys, the liver, the muscle, and the fat in animal tissues.

Within the KOE watershed, surface water grab samples were collected using a Van Dorn water column sampler housed in 500 mL Nalgene bottles, placed in a cooler until it could be stored in a 4°C freezer and then transported to Charles E. Schmidt College of Science Biochemistry BSL II Laboratory for analysis using a NeoGen Elisa Assay. Preliminary analysis for nitrates was determined using a Vernier nitrate probe. Results indicate there was indeed presence of FM. Future investigations should involve testing local agricultural flora for FM systemic uptake.

Additionally, milk was quantified in a similar manner from each corresponding dairy farm tested for potential contamination of flunixin. FM was found in the milk, albeit in trace amounts.