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"An Unbiased and Independent Ag Services Business—Using Data to Make Decisions"

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Ecosystems
14246 Keb Lane
Ottumwa, IA 52501

RE: Agronomist Review for Swift Pork Company – Ottumwa, IA Permit# 90-SDP-15-16P

The following is an agronomic review of waste products applied from the Swift Pork Company in Ottumwa, Iowa to land in Wapello County, Iowa under permit # 90-SDP-15-16P. Waste was applied in the 2025 crop year. A brief description of the regulated waste product will be given to provide context of the review and a brief discussion of the land application sites, application rates and site characteristics will be done as well.

Product Description:

The Swift Pork Company is permitted to apply approximately 2.08 dry ton per acre per year. The by-product consists of an aerobically and anaerobically digested industrial sludge. The sludge originates from the Swift Pork processing plan in Ottumwa, IA. The waste consists of wastewater and effluent that is the by-product of wastes associated with meat processing of livestock such as, animal by-products, manure, and rinse water. Domestic waste from the processing facility is also included in the sludge.

An application of rate of approximately 2.08 dry tons per acre of the by-product will supply about 101 pounds of available nitrogen and about 114 lbs. of P_2O_5 and 20 lbs. of K_2O, assuming incorporation after 48 hours. The organic nitrogen in the product will be slowly converted to plant available nitrate as soil microbes convert it – thus, its availability will depend on numerous environmental conditions including, soil temperature, moisture, drainage and pH. It should be noted that the product does not contain significant levels of arsenic, lead or mercury.

A corn crop with a yield of 200 bushels per acre will require approximately 180-190 pounds of nitrogen and will remove about 64 pounds of phosphorus and 44 pounds of potassium per acre. A soybean crop with a yield of 50 bushels per acre will require approximately 190 pounds of nitrogen (fixed on its own), 36 pounds of phosphorus and 60 pounds of potassium per acre each year. An alfalfa crop will remove

about 13 pounds of P2O5 and 43 pounds of K2O. From an agronomic perspective, soil fertility in the high range is preferred. This translates to ±26 ppm for phosphorus using the Mehlich-3 P test and ±221 ppm for Potassium (ammonium acetate or Mehlich-3). The opinion in this review will be based on characteristics and rates of the applied waste product, current soil tests and land application site conditions.

Land Application Sites for 2025 Crop Year:

Site	Permitted Acres	Acres Applied	Rate	Dry Tons Applied	By Product	Application Period
Brown Ewing	445	240	1.2	295.5	Industrial Sludge	3rd Quarter
Jirsa	138	138	1.6	226	Industrial Sludge	4th Quarter
Johnson 70 & 40	106	106	1.6	174.7	Industrial Sludge	4th Quarter

The fields used for land application were evaluated for soil phosphorus levels, and soil pH. No information was provided for soil salt levels. Farms with a soil pH below 6.0 should receive an application of agricultural lime. Salt levels should be managed to maintain levels below 1.0, future testing is recommended to evaluate the impact of applications on soil conditions. Fields with a phosphorus level exceeding 34 ppm in the Mehlich-3 P test should be managed so that fertility levels do not increase, thus applying nutrients at crop removal rates. A summary of field characteristics is shown below – site specific discussion follows:

Farmer	Site	pH	MEH-3 P	Salts	Net P2O5	Net K2O
Dennis Brown	Brown Ewing	6.2	34	0.3	15	-80
Mike Hammes	Jirsa	5.6	12	0.2	18	-33
Mike Hammes	Johnson 70 & 40	6.8	23	0.3	22	-31

Land Application Sites for 2025 Crop Year:

Brown Ewing: This farm received 295.5 dry tons of product applied on approximately 240 acres in the 4th Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Soybeans yield of 79 Bushels per acre was harvested on the farm. Based on this yield, approximately 57 lbs. of P2O5 and 95 lbs. of K2O were removed. Soil test results show that the organic matter levels are approximately 3.6%, the phosphorus ranges from a minimum of 13 and a max of 45 with an average of 34 ppm; the Very High range according to Iowa State University. Soil potassium averages 168 ppm; the Optimum range according to Iowa State University. Based on the cummulative application rate and reported crop yields, a net of 15 lbs of P2O5 and -80 lbs of K2O are calculated on

these acres. Average soil pH is 6.2 - Slightly Acidic and should be monitored to maintain soil pH near 6.5. Reported salt (EC) levels are 0.3 mhoms/dm and there are no concerns related to current measured salt levels.

Jirsa: This farm received 225.9 dry tons of product applied on approximately 138 acres in the 4th Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Corn yield of 240 Bushels per acre was harvested on the farm. Based on this yield, approximately 77 lbs. of P_2O_5 and 53 lbs. of K_2O were removed. Soil test results show that the organic matter levels are approximately 3.6%, the phosphorus ranges from a minimum of 9 and a max of 17 with an average of 12 ppm; the Low range according to Iowa State University. Soil potassium averages 124 ppm; the Low range according to Iowa State University. Based on the cummulative application rate and reported crop yields, a net of 18 lbs of P_2O_5 and -33 lbs of K_2O are calculated on these acres. Average soil pH is 5.6 - Very Acidic and should be treated with agricultural lime to raise the pH to 6.5. Reported salt (EC) levels are 0.2 mhoms/dm and there are no concerns related to current measured salt levels.

Johnson 70 & 40: This farm received 174.7 dry tons of product applied on approximately 106 acres in the 4th Quarter of the 2024-2025 crop year. A single by-product source was applied to the acres. A reported Corn yield of 231 Bushels per acre was harvested on the farm. Based on this yield, approximately 74 lbs. of P_2O_5 and 51 lbs. of K_2O were removed. Soil test results show that the organic matter levels are approximately 3.3%, the phosphorus ranges from a minimum of 17 and a max of 31 with an average of 23 ppm; the High range according to Iowa State University. Soil potassium averages 126 ppm; the Low range according to Iowa State University. Based on the cummulative application rate and reported crop yields, a net of 22 lbs of P_2O_5 and -31 lbs of K_2O are calculated on these acres. Average soil pH is 6.8 - Neutral and no action is needed. Reported salt (EC) levels are 0.3 mhoms/dm and there are no concerns related to current measured salt levels.

The fields used for land application were evaluated for soil phosphorus levels, and soil pH. It is recommended that farms be tested for salt in the future, so that they can be evaluated in future reviews. Farms with a soil pH below 6.0 should receive an application of agricultural lime. Salt levels should be managed to maintain levels below 1.0, no levels were reported in this review. Fields with a phosphorus level exceeding 34 ppm should managed so that fertility levels do not increase, thus applying nutrients at crop removal rates.

Soil phosphorus and applied nitrogen are the primary nutrients of concern to water quality and public health. The reported rates of Nitrogen do not pose a risk to water quality. The applied phosphorus rates in conjunction with the reported nutrient removal rates do not pose a significant risk to environmental quality or public health. Best management practices in nutrient management and land application should always be followed.

Regards,

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