CRC for High Integrity Australian Pork

4C-112: *On-farm evaluation of a pond-less piggery effluent treatment system using novel flocculation and filtration techniques*

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Aims and Objectives:

The Z-Filter, a novel de-watering and filtering system, developed in Western Australia to treat waste streams in the mining, municipal waste and food processing industries. This project was undertaken to evaluate the use of a Z-Filter to treat piggery effluent and to assess the extent to which it could replace ponds in treatment systems. The Z-Filter was used to treat effluent from a single grower-finisher shed with the TS concentration varying from 1.3% to 2.4%.

Key Findings

The average removal rates were 58% for TS, 73% for VS, 35% for total N and 50% for P. The average dry matter content (TS) of the separated solids was 22%.

Data from the trial were used to calculate the capital, operating and chemical costs of operating the Z-Filter which were then combined with output from PigBal 4 simulations of 200 and 2,000 sow farrow-to-finish piggeries to estimate the cost of operating a Z-Filter on a commercial scale. The estimated cost ranged from $50 to $132 per tonne of TS treated, depending on herd size and the TS concentration of the effluent. This equated to $0.04 to $0.12 per kg HSCW of finisher pigs sold. However, this did not take into account any revenue from by-products or potential savings in capital investment in other parts of the treatment system.

The PigBal 4 model was also used to quantify the nutrient content of the separated solids to which a fertiliser unit price was applied. The net value of these nutrients was conservatively estimated to be equivalent to about 20% of the operating cost of the Z-Filter.

Application to Industry

Removal rates achieved by the Z-Filter were higher than most values reported for other types of separation systems in common use. However, the Z-Filter, in common with other mechanical systems, was unable to remove colloidal and aqueous phase solids from the filtrate, necessitating its further treatment in an anaerobic pond. Nevertheless, removal of 75% of the VS would decrease the required pond size by about 60%, resulting in considerable savings in capital expenditure which may offset that incurred by the Z-Filter.

This project was conducted with a prototype Z-Filter which performed reliably during the trial. The manufacturer is confident the commercial model of the Z-Filter, with regular maintenance, will have a lifespan of about 20 years. However, the long term performance of the commercial model of Z-Filter is yet to be determined. Day to day operation of the Z-Filter was relatively easy, requiring a medium degree of maintenance and supervision. Some degree of operator training would be required.

Some producers may view the Z-Filter as complex to operate and outside the competency of their staff. Unless considerable economic benefits can be demonstrated or environmental constraints prevent the use of traditional systems, producers may be reluctant to replace traditional pond systems with more sophisticated alternatives.