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Environmental control and waste disposal

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Environmental control and waste disposal

Abstract
A system for aerobic oxidation of waste has been used continuously since 1968 and is now functioning successfully. Figure 11.1 shows general design of the units. Originally "paddle wheels" were used to circulate liquid waste, keep solids in suspension, and mix oxygen into the liquid. Their performance, however, was less than desirable. Excessive foaming of liquid in the pits kept recurring, and maintenance of "paddle wheels" was expensive and time consuming.; Swine Day, Manhattan, KS, November 14, 1974

Keywords
Swine day, 1974; Kansas Agricultural Experiment Station contribution; no. 483; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 221; Swine; Environmental control; Waste disposal

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Originally "paddle wheels" were used to circulate liquid waste, keep solids in suspension, and mix oxygen into the liquid. Their performance, however, was less than desirable. Excessive foaming of liquid in the pits kept recurring, and maintenance of "paddle wheels" was expensive and time consuming.

In late 1971 and early 1972 all "paddle wheels" were replaced by Aerob-A-Jets which require little maintenance time. Oxidation of solids in the pits has continued at a satisfactory rate; odors have remained at an acceptable level, and foaming has been reduced to a minimum. All data reported here (Table 11.1) were collected in 1974 since the conversion to Aerob-A-Jets.

In November, 1973, a negative ion dispersion system was installed in the nursery barn and farrowing barn to suppress atmospheric dust (Clean Air Systems, Inc.). Though equipment needed to measure reduction in atmospheric dust or odor levels has not been available, persons working in both barns report they are coughing less and have less eye and nasal irritation than before. It has been impossible to measure differences in pig responses, but no ill effects have been observed.

In April, 1974, we began to add small quantities of a commercial bacterial preparation to each of the pits (Puritan Live Micro-Organisms) in an attempt to further reduce odors. Measurements are not yet available, but observations by those involved are favorable. One obnoxious odor (probably $H_2S$) has disappeared.
Table 11.1 Data From Aerobic Oxidation Pits Installed in Swine-production Facilities at Kansas State University in 1968.

<table>
<thead>
<tr>
<th>Pit¹:</th>
<th>January, 1974</th>
<th>March, 1974</th>
<th>June, 1974</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5</td>
<td>1  2  3  4  5</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Energy per day, KWH</td>
<td>70.0 41.9 ---- 70.6 ----</td>
<td>65.6 ---- ---- 60.0 ----</td>
<td>---- 36.9 ---- ---- ----</td>
</tr>
<tr>
<td>Fluid temp., °F.</td>
<td>66 72 70 63 68</td>
<td>70 70 70 66² 75</td>
<td>77 78 77 73 73</td>
</tr>
<tr>
<td>Fluid pH, paper</td>
<td>6.5 8.0 8.0 8.0 8.0</td>
<td>6.5 7.0 7.0 7.0 7.5</td>
<td>5.0 7.8 7.8 8.2 8.2</td>
</tr>
<tr>
<td>Fluid D.M.ᵃ,%</td>
<td>0.62 2.21 1.58 2.59 1.86</td>
<td>0.77 1.21 1.53 2.11 2.27</td>
<td>--- --- 1.46 --- 2.48</td>
</tr>
<tr>
<td>C.P. in Fluid D.M.,%</td>
<td>30.2 35.6 33.8 27.1 24.1</td>
<td>30.6 23.6 31.8 24.1 23.3</td>
<td>--- --- 32.3 --- 23.3</td>
</tr>
<tr>
<td>C.F. in Fluid D.M.,%</td>
<td>3.9 5.9 2.6 7.3 6.7</td>
<td>7.2 2.2 1.8 3.8 5.9</td>
<td>--- --- 4.38 --- 5.5</td>
</tr>
<tr>
<td>Ash in Fluid D.M.,%</td>
<td>39.9 30.3 38.8 38.0 43.7</td>
<td>34.5 30.8 34.7 37.3 39.0</td>
<td>--- --- 32.9 --- 40.7</td>
</tr>
</tbody>
</table>

¹ = Farrowing Barn  
² = South Nursery  
³ = North Nursery  
⁴ = South Finishing Barn  
⁵ = North Finishing Barn

² = Hydrant water = 53° F.  
ᵃ = Dry Matter
Figure 11.1. General Design Information

NURSERY BARN

2 identical pits

Pit Depth 48 in.

Fluid Depth 22 in.

85 ft.

Overflow Standpipe

FARROWING BARN

1 pit

Pit Depth 48 in.

Fluid Depth 26 in.

8 ft.

90 ft.

Overflow Standpipe

FINISHING BARN

2 identical pits

Pit Depth 48 in.

Fluid Depth 20 in.

8 ft.

100 ft.

Overflow Standpipe